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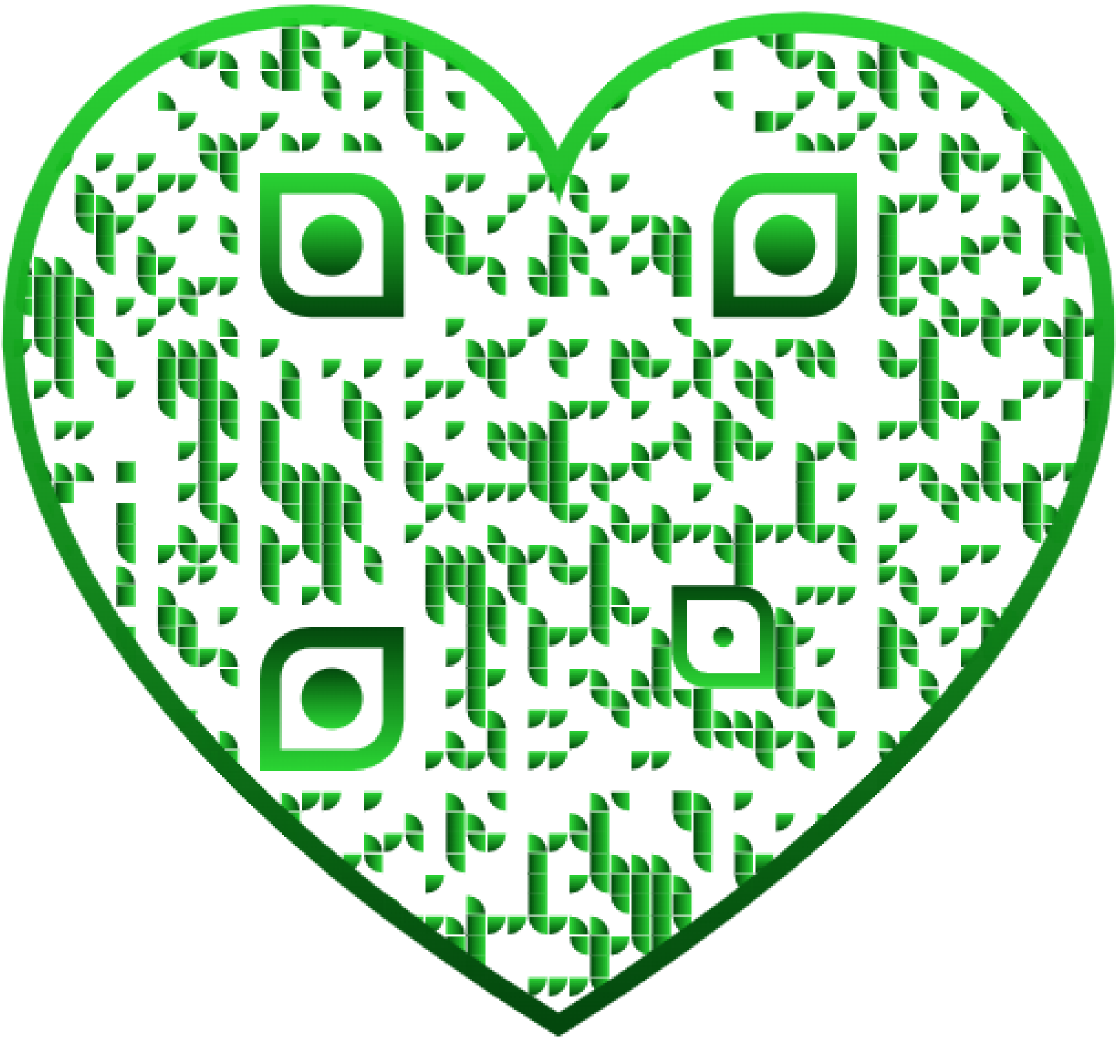

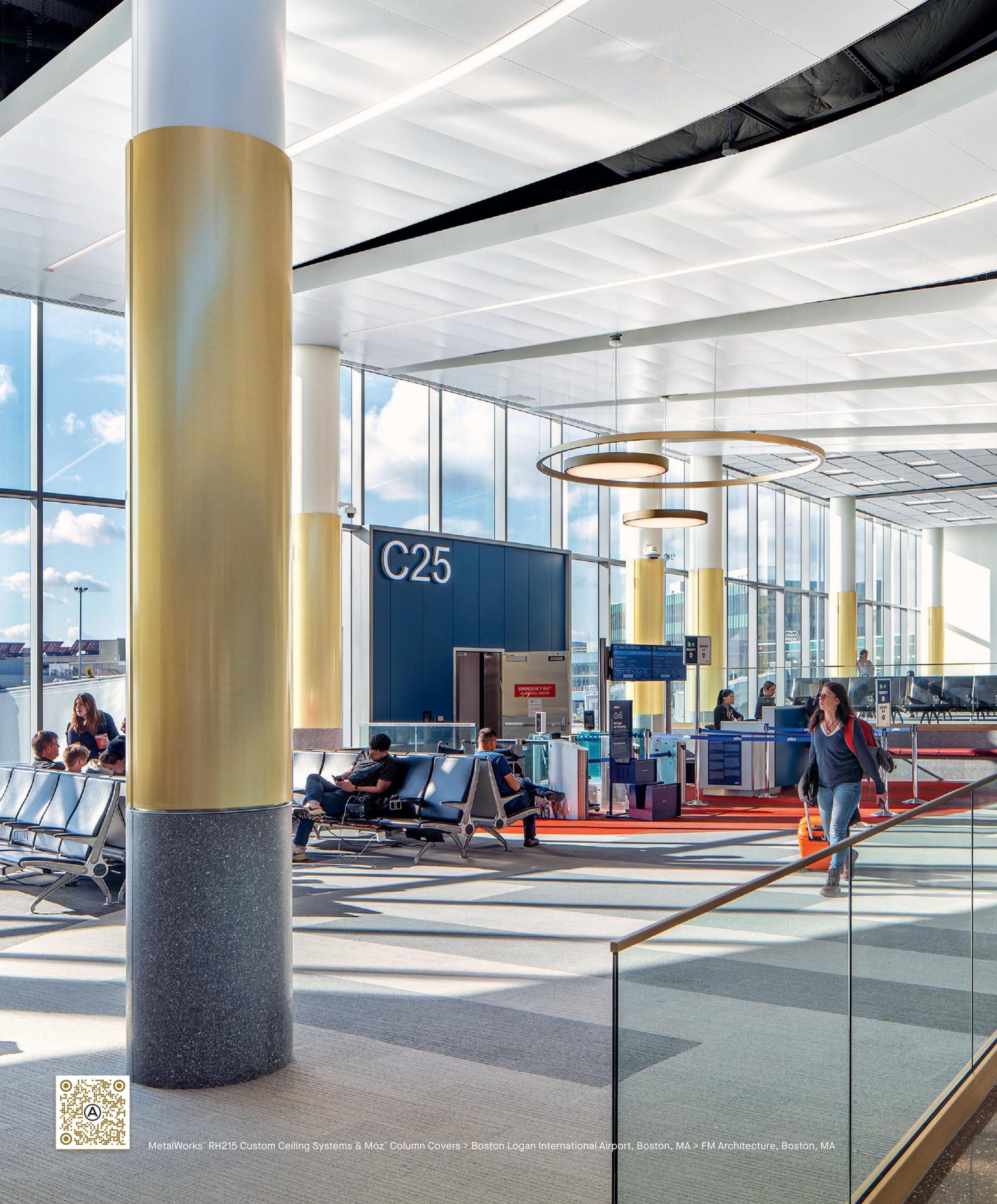
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ART DIRECTOR	Michael T. Powell, *powellm@bnpmedia.com*
CONTRIBUTING ILLUSTRATOR, PRESENTATION DRAWINGS	Peter Coe
EDITOR AT LARGE	Molly Heintz, *heintzm@bnpmedia.com*
CONTRIBUTING EDITORS	Sarah Amelar, James Gauer, John King, Izzy Kornblatt, Katharine Logan, Cathleen McGuigan, Clifford A. Pearson, Naomi Pollock, FAIA, James Russell, FAIA Emeritus, David Sokol, Suzanne Stephens
INTERNATIONAL CORRESPONDENTS	Tim Abrahams, Andrew Ayers, Aric Chen, David Cohn, Chris Foges
CONTRIBUTING PHOTOGRAPHERS	Iwan Baan, Roland Halbe

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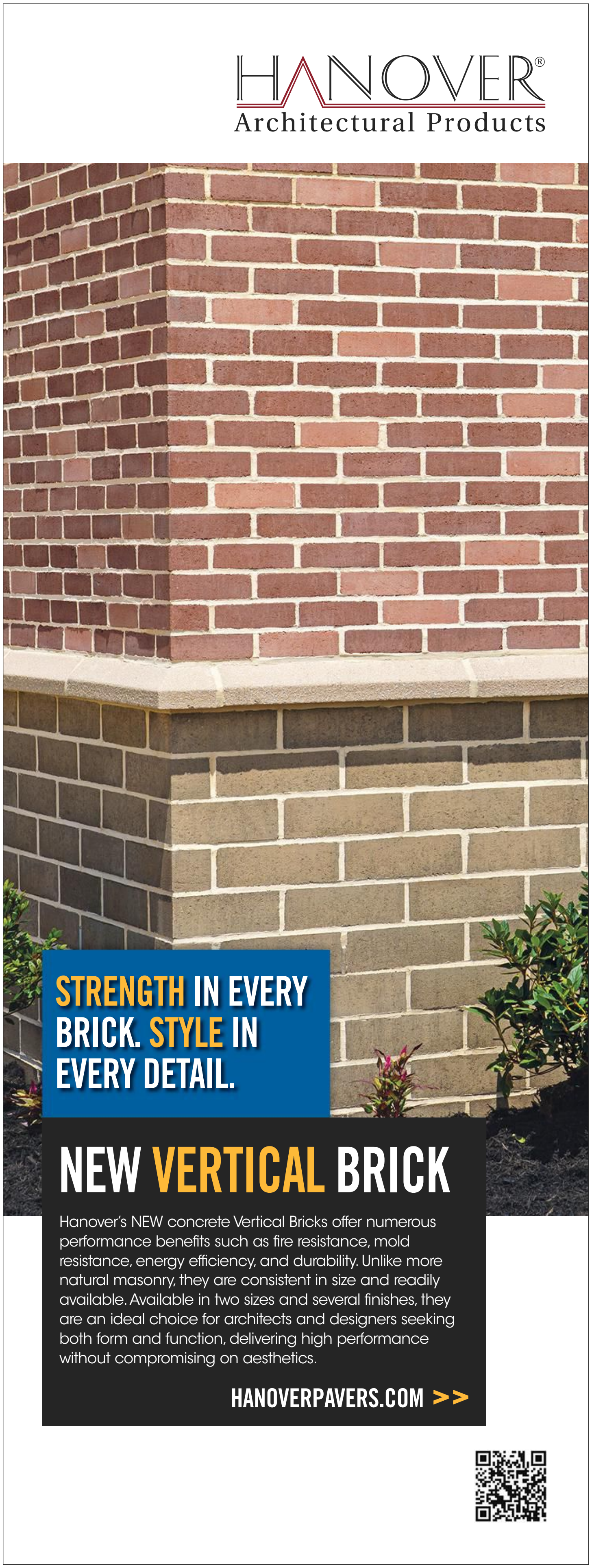

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WORKFORCE/RECRUITMENT: Diane Soister
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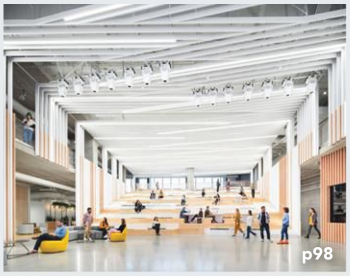

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Architects on Architects

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AMONG THE STAFF at RECORD, there are plenty of degrees in architecture, urban studies, and conservation. And several of us have worked in architectural offices, big and small. Deputy editor Joann Gonchar is even a Fellow of the AIA—an esteemed distinction from that now-troubled association of architects. But it's been a while since any of us has put pencil to paper to design anything, choosing instead to contribute to the written discourse about architecture.

With regard to that discourse, the magazine has published pieces written by practicing architects—book reviews, commentaries, tributes, practice stories—but rarely, if ever, have we asked an architect to write about the just-completed work of a contemporary, partly because of a generally held assumption that architects may be too competitive (and therefore biased) to fairly discuss the work of another firm. Nevertheless, we thought we'd give it a shot for this first issue of 2025. And the architects we asked to write have a lot to say!

The project section, what we're calling "Architects on Architects," features new buildings on three notable campuses—two academic and one a historic working studio lot for a media giant. The coprincipals of Los Angeles–based studio The LADG, Andrew Holder and Claus Benjamin Freyinger, have tackled the world of motion picture and television production, writing about a campus renovation at NBCUniversal by Lever Architecture and Field Operations in The LADG's hometown. A longtime resident of Boston, NADAAA principal Nader Tehrani gives his perspective on SANAA's new home for music at MIT, a place where he too has built. And in yet another example, contributing editor James Gauer, an architect who ran his own office for two decades, discusses the U.S. debut of Zurich-based Karamuk Kuo, designers of an addition to the architecture school at Rice University.

Outside of those projects, we offer a first look at a recently completed building in Berlin by Sauerbruch Hutton, featured on the cover. If it feels strangely familiar, that's because it's a contemporary architect's take on an unbuilt project by none other than Mies van der Rohe. You may have seen the 4½-foot by 9½-foot charcoal and crayon drawing of his "Concrete Office Building" (1923) on display at New York's Museum of Modern Art, where the substantial work is part of the collection. In Sauerbruch Hutton's version, concrete spandrels are replaced by individually hung panels in terra-cotta, a favorite material of the firm, which, here, in a move toward sustainability, can be easily disassembled.

Deconstructability is a key aspect of many of the projects in our special section on prefabrication—defabrication instead of demolition! We examine advances in modular and transportable construction in building types that include multifamily housing, accessory dwelling units, public facilities, infrastructure, airports, and retail.

As a magazine for the profession, we strive to bring our readers the latest projects and the latest innovations, as well as opinion pieces by architects and non-architects alike—in short, to be a trusted resource. As we were closing this issue, news broke that Lakisha Woods—scandal-plagued since early last year—would leave her position as EVP/CEO of the AIA. A statement released by the AIA "celebrates [the] accomplishments of Woods" during her tenure—just three short years by the time she steps down in February—without addressing the specifics of her departure. The insincerity and lack of transparency leave us skeptical of anything the AIA has to say, and highlights the importance of journalism when an organization, in this case one intended to serve architects, is not fulfilling its mission. As *the* organization for the profession, the AIA needs to do better for architects.

Josephine Minutillo, Editor in Chief

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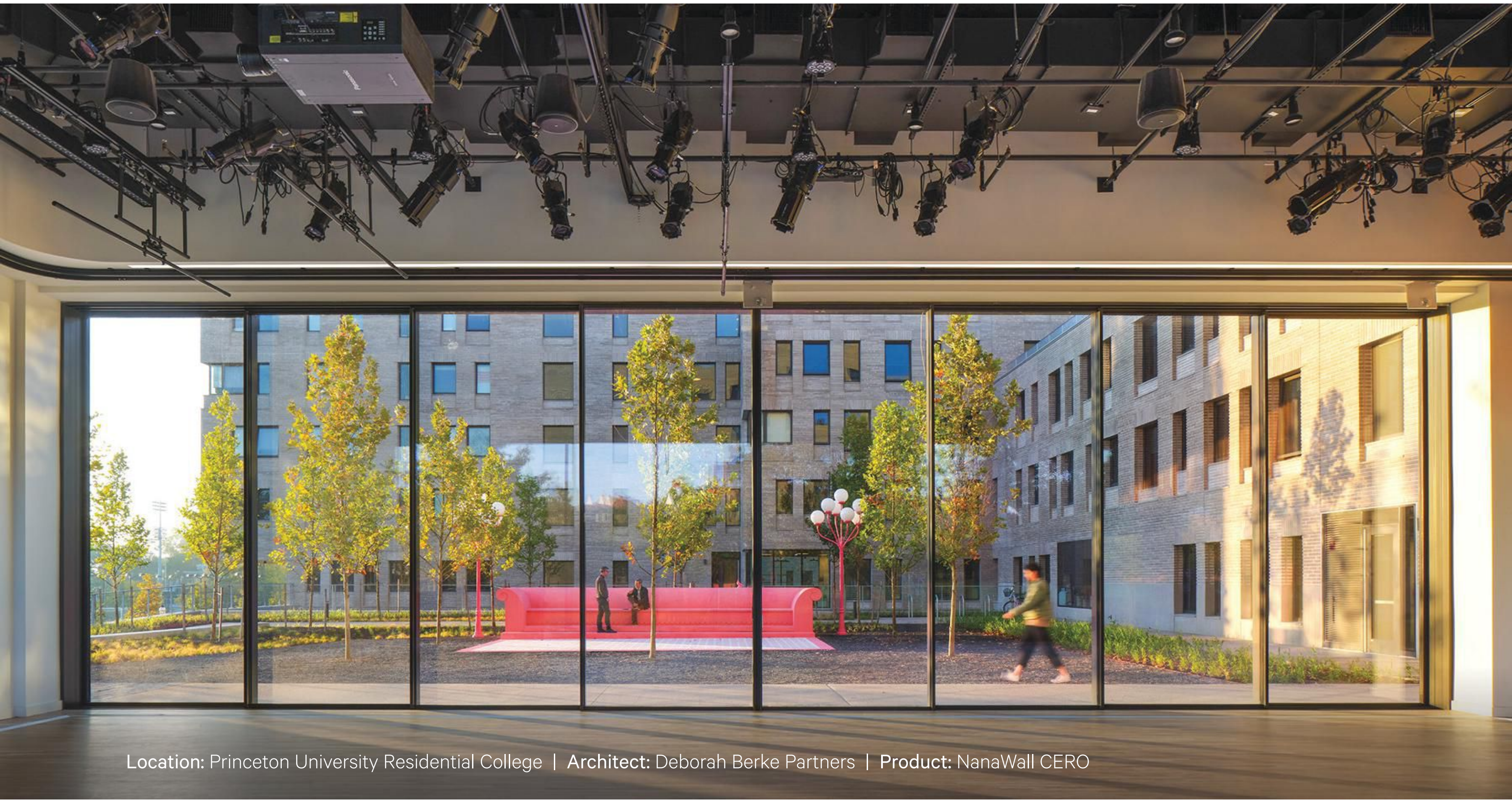

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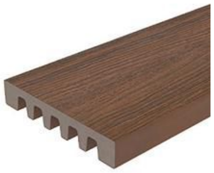
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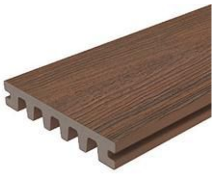
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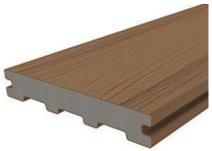
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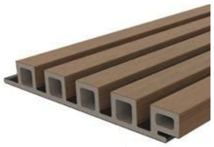
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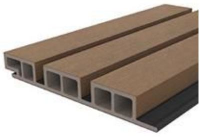
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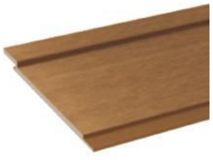
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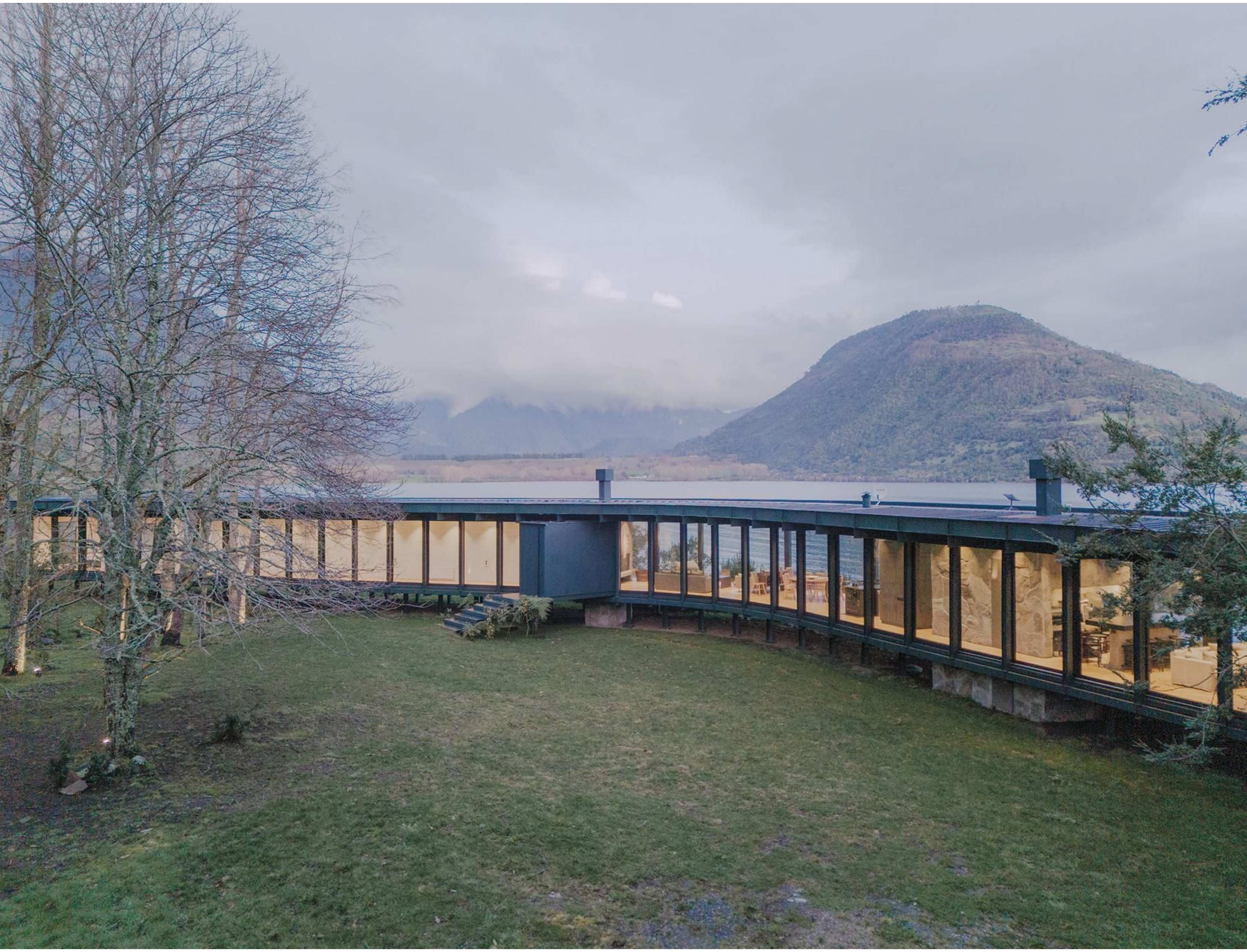
HOUSE of the Month

A STEEL STRUCTURAL MODULE REPEATS ALONG A CURVED PLAN AT A LAKEFRONT HOUSE IN SOUTHERN CHILE. **BY MOLLY HEINTZ**



The linear Casa Curva, situated on the northern shores of Lago Ranco, inflects toward the water with a single bend.

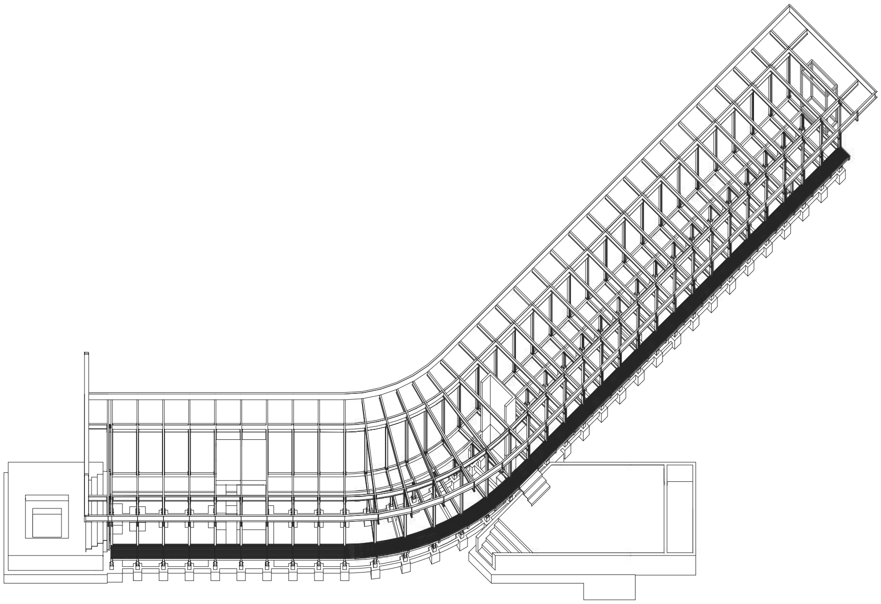
PHOTOGRAPHY: © MARCOS ZEGERS

LAGO RANCO, one of the largest and deepest lakes in Chile, is known for its dramatic setting in the Andean foothills, its generous lakeside beaches, and local lore that tells of mythical aquatic creatures lurking in the water's depths. The fabled lake in Los Ríos has continuously lured a Santiago-based family to return to the remote region, generation after generation, faithfully traveling on weekends and holidays from their home in Chile's capital city, a 10-hour drive or 90-minute flight to the north. Two brothers who spent time camping at the lake as children now each have their own house a two-minute walk apart, both designed by the Chilean studio Hevia Poblete Arquitectos.

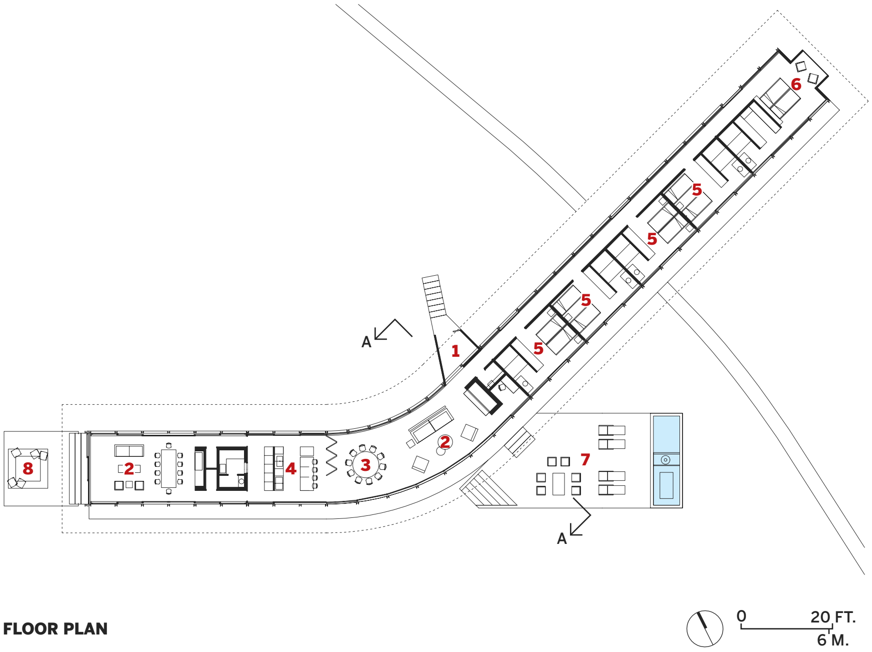
The more recently completed of the two houses, known as Casa Curva, lightly perches on the northern edge of Lago Ranco. "The client said, 'We love my brother's place, but we don't like wood or exposed structures, and we want something with a lot of views,'" says partner Guillermo Hevia, referring to the first lodge-style retreat that the firm designed.

To accomplish this, the architects took a cue from the industrial design of modern infrastructure, like the bridges, docks, and steel ships common in the region (which is also known for its history of logging). The concept was to have a house with a single section through a repeating steel-framed module.

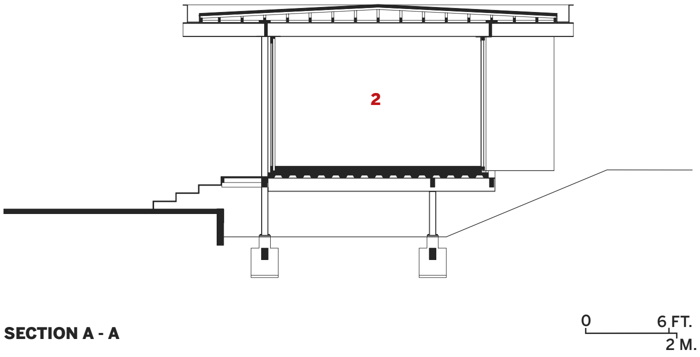
The columns of a steel exoskeleton are secured in concrete footings and topped by a metal roof. In between, the steel units sur-



AXONOMETRIC OF STEEL EXOSKELETON



FLOOR PLAN



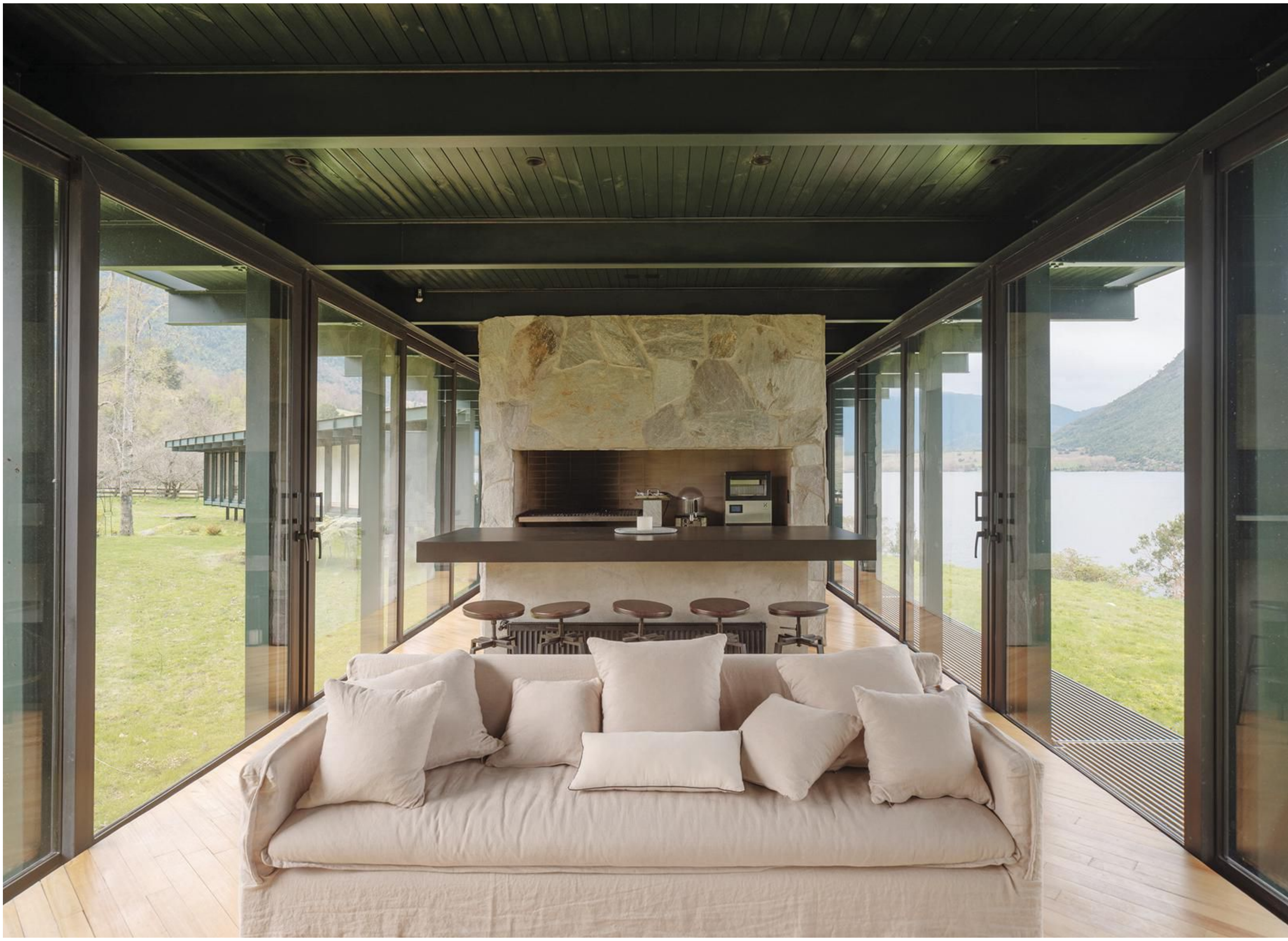
SECTION A - A

1	ENTRY
2	LIVING
3	DINING
4	KITCHEN
5	BEDROOM
6	PRIMARY SUITE
7	PATIO
8	FIREPIT

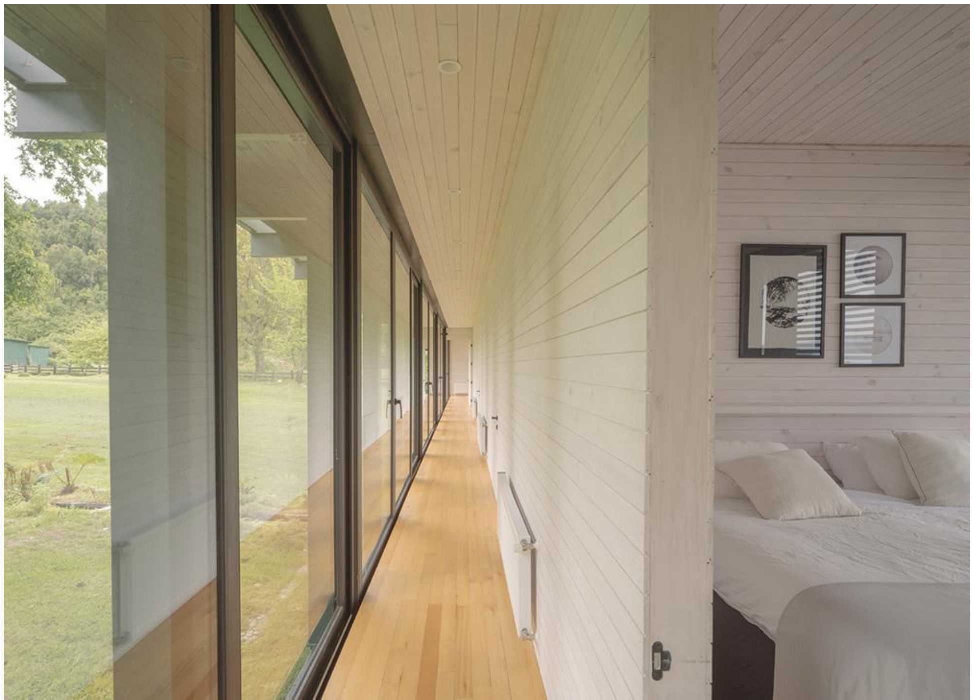
round expansive glass windows that offer sweeping views of the lake to the south and of the forest to the north. Thanks to its modular construction, the exoskeleton and roof were quickly assembled on-site in seven weeks during the warmer months, allowing for the interior work to continue and finish even as the colder rainy season began.

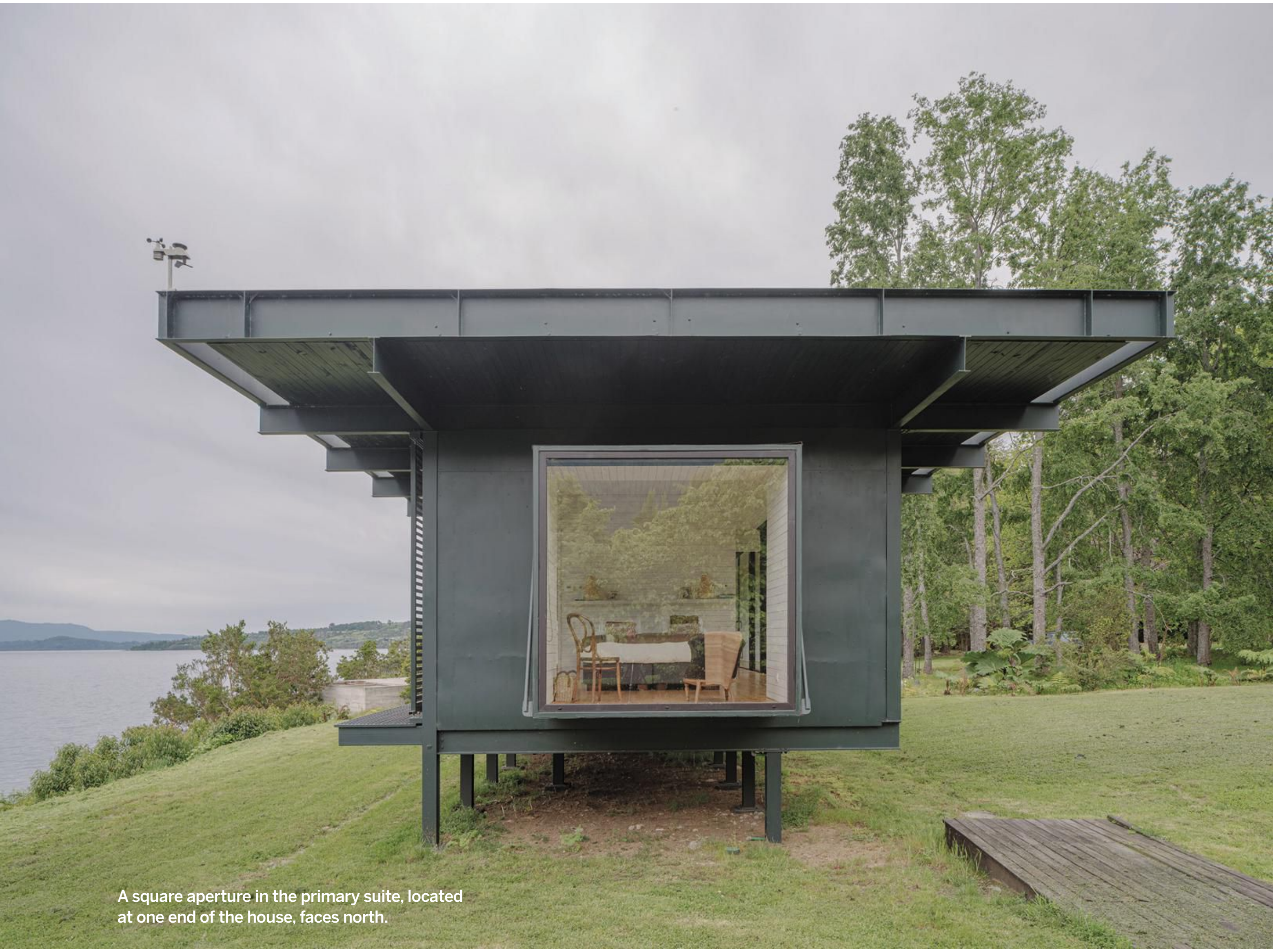
The thin, elongated proportions of the plan respond to the lake's curving shoreline. One long end of the single-story, 3,000-square-foot structure accommodates five bedrooms, each with its own bath and exterior louvers on the windows for additional privacy. The other end is dedicated to a series of social spaces that culminate in a large barbecue pit set in concrete. Extending from the midpoint of the gentle curve, a generous patio of precast concrete tiles connects the house to the lake and offers a lookout for sunning and watching sailboats during the summer.

"When we were talking about the idea of a steel house, the client was worried about the rooms feeling cold," notes partner Catalina Poblete. The architects' solution was to use a variety of woods for interior surfaces, including eucalyptus flooring and pine cladding. Painted white, the bedroom walls and ceilings



The steel exoskeleton is a dark green (opposite), while the interiors are lined with eucalyptus floors, feature stone fireplaces (above), and white-painted pine walls (right).





A square aperture in the primary suite, located at one end of the house, faces north.

are light and bright, while the ceilings of common areas are a dark British racing green that matches the painted steel frame. Two fireplaces, built from stones excavated from the site, rise from the ground through the floor, their hearths creating additional texture in the living and dining areas. Sliding doors allow for the window-walls to open to the outside when weather permits.

For the small firm—the two partners and one staffer—the steel-module-based design allowed the team to strategically balance time between supervising construction and developing details that make the house feel customized rather than prefabricated. The architects like the idea of bringing this structural approach to projects of all scales. "Rather than specialize in a particular building type, we prefer thinking in terms of conceptual approaches and structural systems," says Hevia, who was a 2015 winner, with Nicolás Urzúa, of Constructo, MoMA's Santiago-based Young Architects Program. Their winning installation used reflective enclosures that seemed to expand green spaces for leisure in the middle of the busy city.

Casa Curva's owners, a couple with four adult sons, have a house that can, without moving, seem to expand and contract. The four smaller bedrooms use a different heating system and can be sealed off when not in use. If the whole family arrives with partners and friends, the common areas can comfortably accommodate a large group, and perhaps even draw a new generation of Santiaguinos to the majesty of Lago Ranco. ■

Credits

ARCHITECT: Hevia Poblete Arquitectos — Guillermo Hevia, Catalina Poblete, Felipe Droppelmann

ENGINEER: VPA Valladares Pagliotti & Asociados (structural)

GENERAL CONTRACTOR: Constructora Samuel Muñoz

CLIENT: withheld

SIZE: 3,000 square feet

COST: $300,000 (construction)

COMPLETION DATE: July 2024

Sources

STEEL: Delgado (structure, metal panels)

ROOFING: Arratia (panels); Winhouse (PVC)

INTERIOR FINISHES: Sherwin-Williams (paint); Saffco (flooring); Italinnea, Blum (hardware); Inalco (countertop)

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Crystal Clear

Sauerbruch Hutton wraps a simple volume with a faceted envelope to fashion a jewel box in Berlin's Kreuzberg neighborhood.

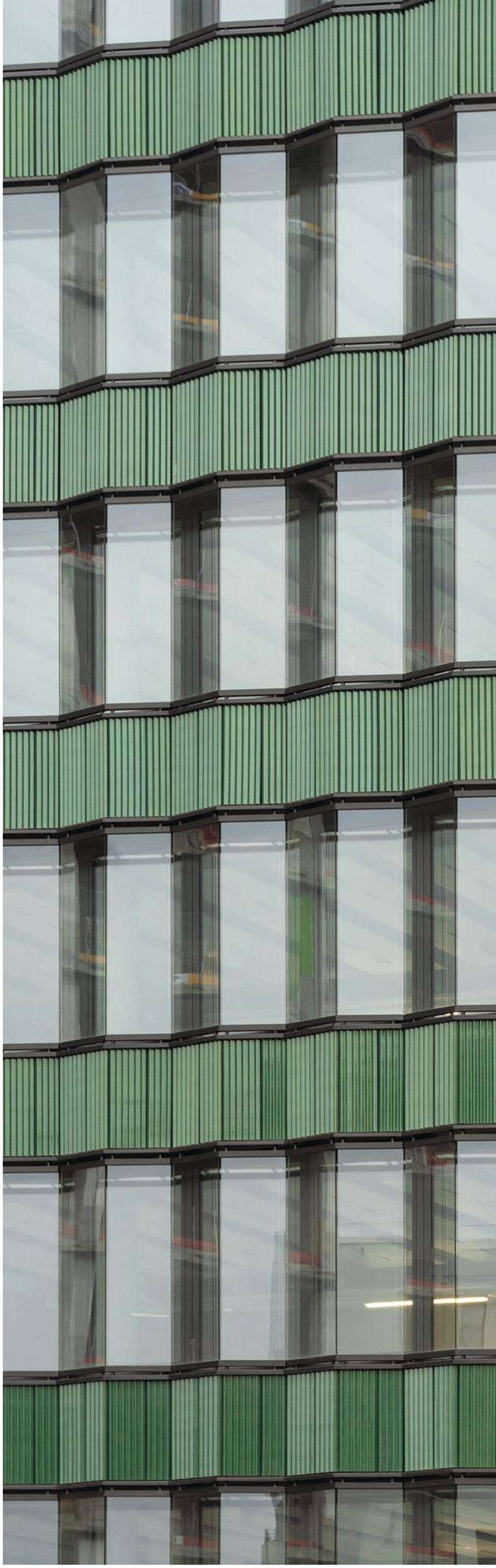
BY LEOPOLDO VILLARDI

IN 2014, Berlin-based Sauerbruch Hutton won a competition to reenvision the site of the Postscheckamt—a 1970s commercial tower with a sprawling single-story plinth—in the city's Kreuzberg neighborhood as a dense mixed-use residential quarter. A few market-driven revisions (and passings of client hands) later, the enclave now partially goes by Die Macherei, or "the makery." It is the third such community in Germany to operate under the moniker, providing office and coworking spaces as well as retail and gastronomic offerings, with plenty of housing next door.

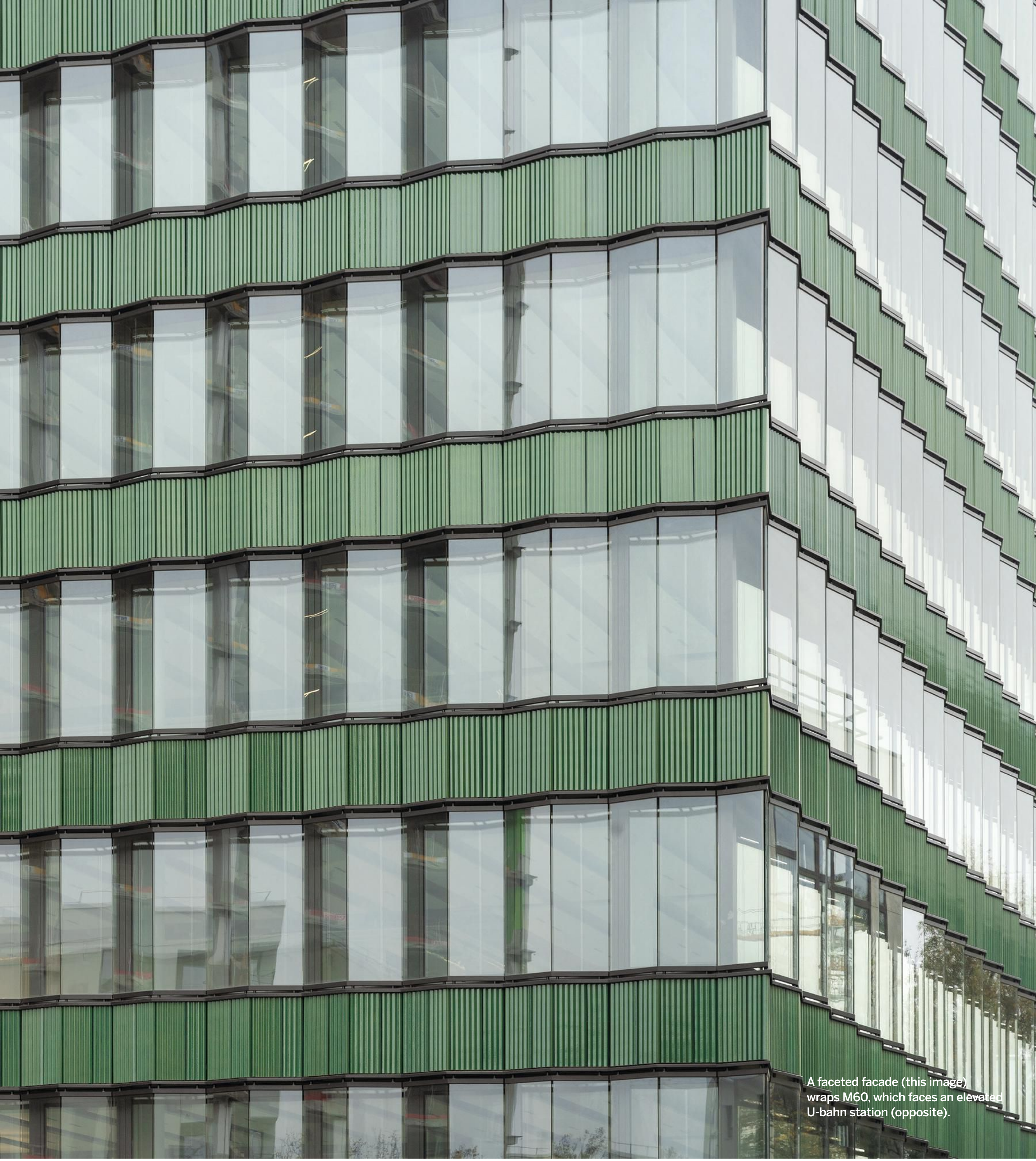
As part of the master plan, the firm situated six mid-rise apartment towers deep within the 7.5-acre site, but, fronting Hallesches Ufer (a road that runs along the Landwehr Canal), it placed three signature office buildings. From east to west, they are: M40, a champagne-colored mass-timber structure designed by KEC Architekten; M50, the new iteration of the 23-story-tall Postscheckamt, which is undergoing a gut renovation and full reclad by Eike Becker; and M60—undoubtedly the gem in the ensemble—an eight-story structure designed by Sauerbruch Hutton.

In its simplicity and clarity of form, M60 shares a familial resemblance with Mies van der Rohe's Concrete Office Building. This unbuilt proposal for central Berlin, dating to 1922–23, freed the facade from the task of structural expression by bringing perimeter columns inside the envelope, producing long horizontal bands of concrete with ribbon windows spanning between them. "Maximum effect with the minimum expenditure of means," Mies wrote at the time. Despite its modernity, the project also showed his predilection for classicism, from the emphasis on axial symmetry to its thin floating cornice.

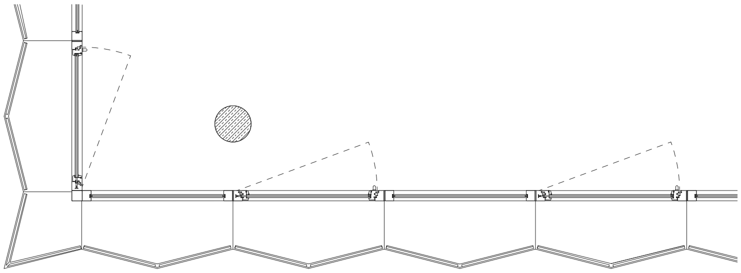
A similar purity undergirds Sauerbruch Hutton's building. But, up close, it has an



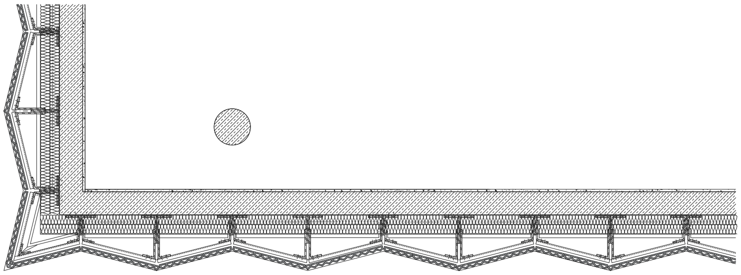
PHOTOGRAPHY: © JAN BITTER



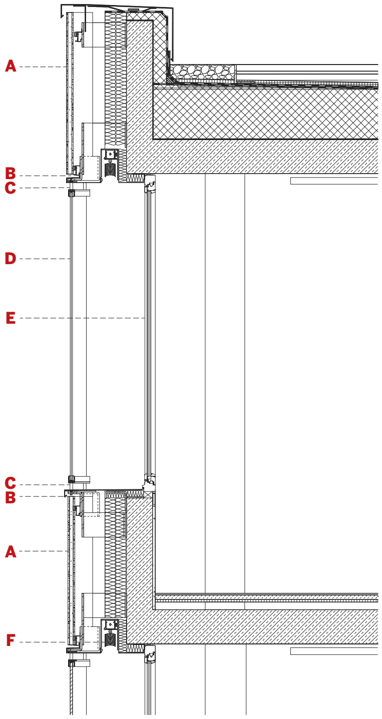
A faceted facade (this image) wraps M60, which faces an elevated U-bahn station (opposite).



HORIZONTAL SECTION GLASS LEVEL



HORIZONTAL SECTION CERAMIC LEVEL



A REAR-VENTILATED CERAMIC FACADE

B AIR GAP

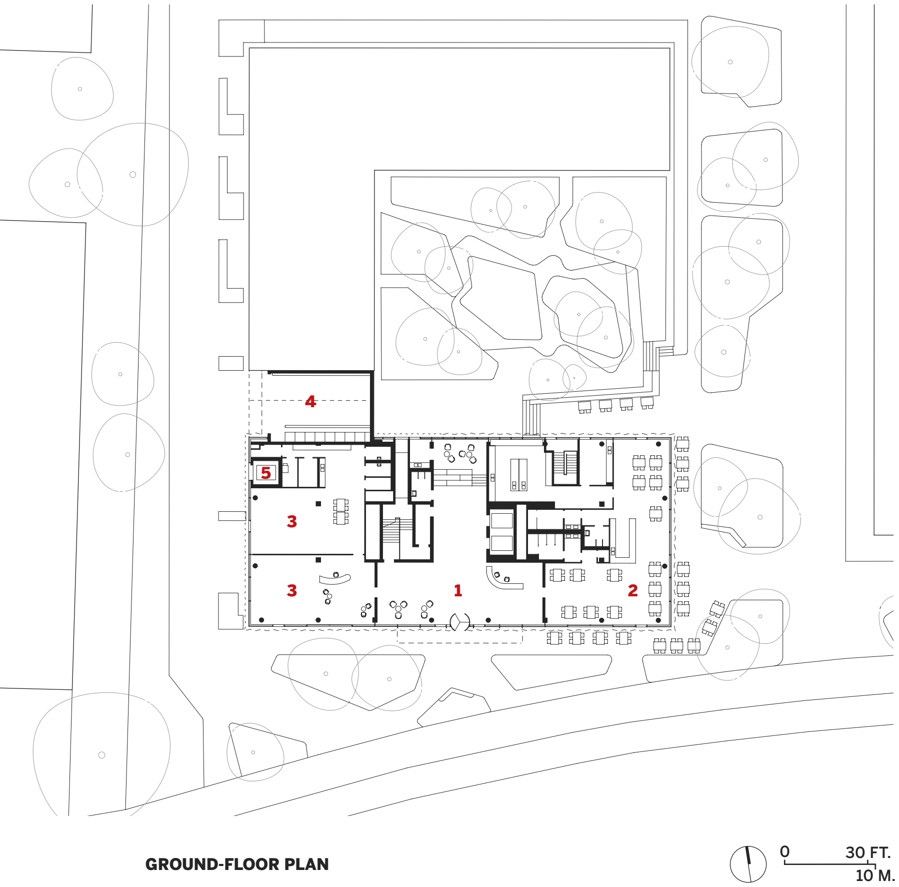
C GAP FOR SMOKE EXTRACTION

D LAMINATED SAFETY GLASS

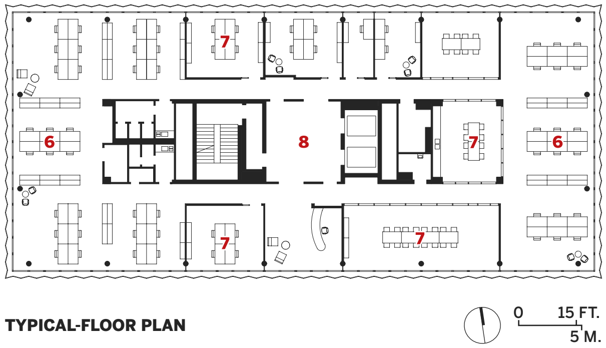
E DOUBLE-GLAZED, ALUMINUM-FRAMED WINDOWS

F BLINDS

VERTICAL SECTION FACADE



GROUND-FLOOR PLAN



TYPICAL-FLOOR PLAN

1 LOBBY

2 RESTAURANT

3 RETAIL

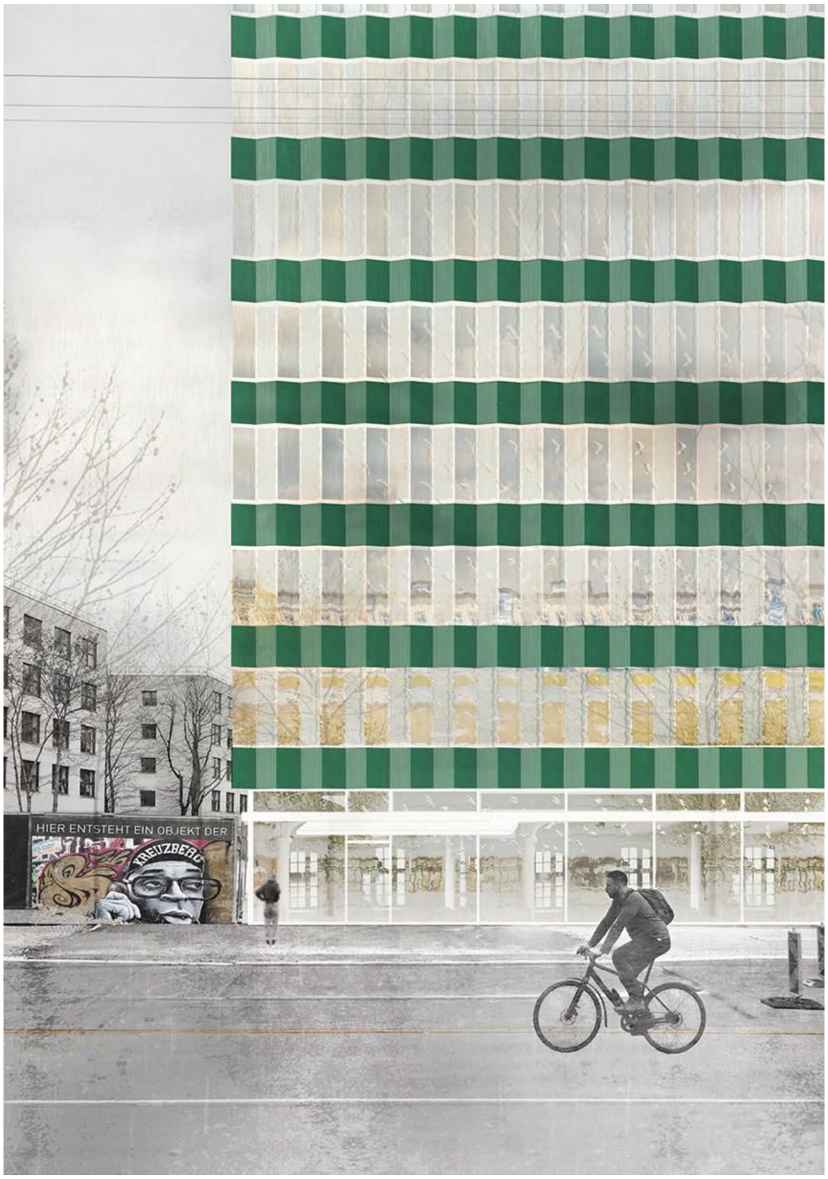
4 RAMP

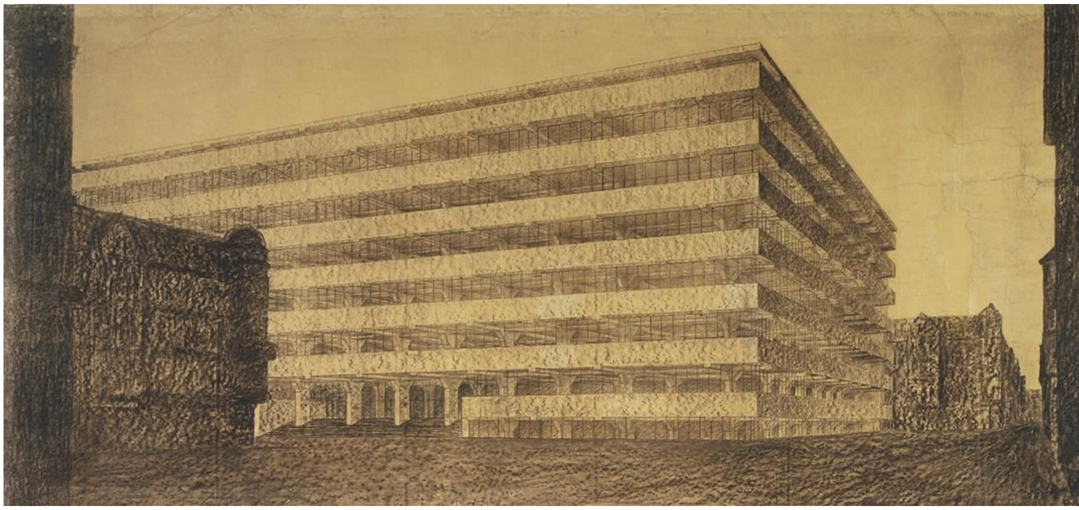
5 FREIGHT ELEVATOR

6 OFFICE

7 CONFERENCE ROOM

8 VESTIBULE





A rendering of M60 (right) shows the clarity of form and horizontal banding that it shares with Mies's Concrete Office Building (below, right).

abundance of interesting details to offer. Like many of the firm's most recognizable projects, M60 prominently features architectural terra-cotta, but it is more sobering than the polychromatic GSW Headquarters nearby and Italy's M9 Museum District (RECORD, February 2019). Its faceted glass-and-ceramic facade reflects a pixelated version of the city to passing pedestrians, cyclists, and rail commuters alike (the elevated U-Bahn station Möckernbrücke is across the street). Within the warp and weft of Kreuzberg's postindustrial urban fabric, it feels both at home amid abundant loft spaces and glazed bricks, but—with glinting emerald-green panels—M60 is also something of an ever-changing jewel box.

Not only do these ceramic spandrels zigzag and terminate in bladelike corners, but individual units (of which there are nine different types) feature vertical corrugation. Their green cast takes on varying hues depending on the light, while subtle dappling adds visual texture. "NBK is really willing to test glazes," says project partner David Wegener of the terra-cotta manufacturer. "They managed to achieve this handmade look, even though production is fully computerized."

These units are, importantly, not permanently affixed to the facade with an adhesive, or even bonded together with mortar. Rather, they're individually hung, a process that is more expensive and time-consuming but also more sustainable in the long term. Wegener recalls asking the team, "What is the right approach for this typology during the *Bauwende*"—a German word without a direct English translation that encompasses the profession's current shift toward circularity and other sustainable practices—"when a client insists on using concrete?" Sauerbruch Hutton's solution: radical deconstructability. The wall system can be disassembled into reusable constituent parts, something adhesives would have prevented. Binding agents also affect an envelope's breathability, Wegener explains. "It's like tiling a building from the outside, which, from a physics perspective, is quite bad."

The faceted geometry comes with other benefits as well. The bands of glazing comprise an outer layer of angled, coated panes spaced ¾ inch apart, reducing acoustic reverberation from passing trains and solar infiltration, with an inner layer of operable windows. The ventilated cavity between them helps regulate temperature, exhausts smoke in

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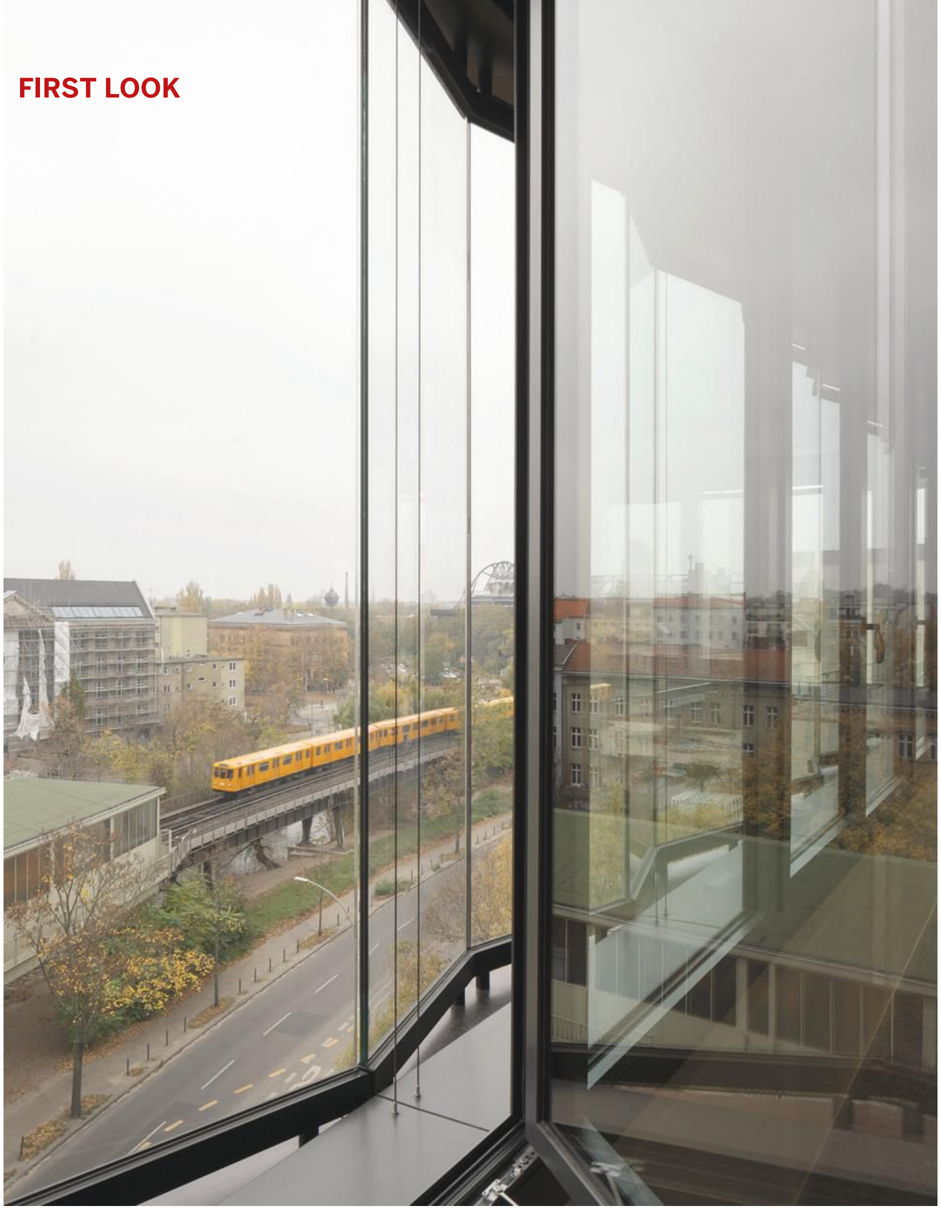

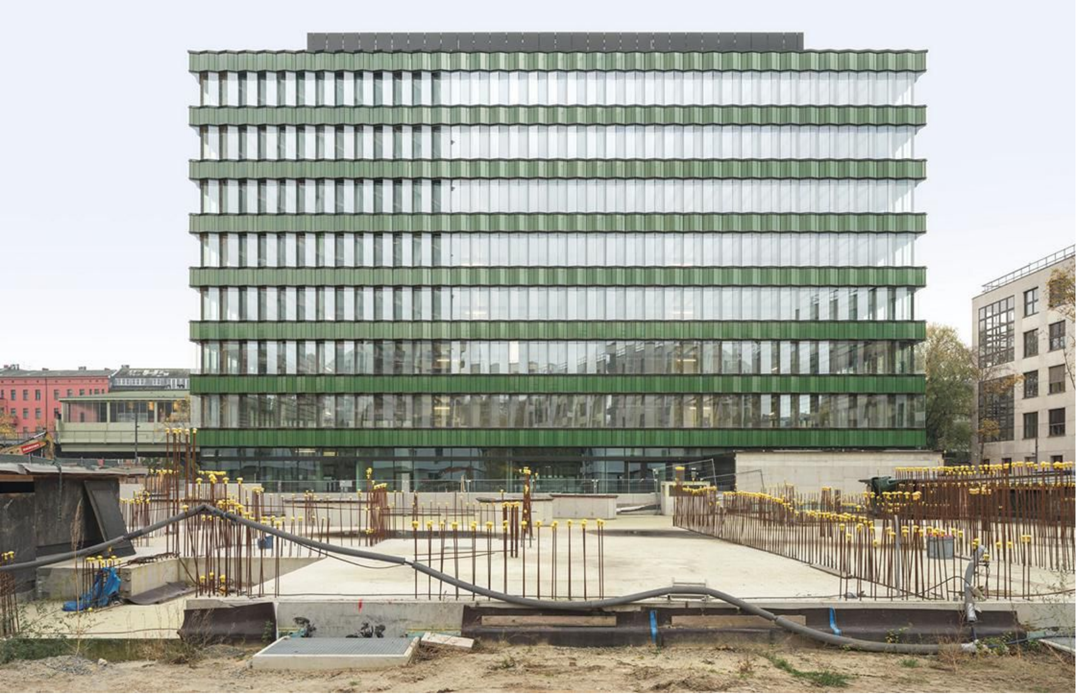

Gaps between the facade's outer panes promote airflow (left). Construction continues at the Die Macherei site (left, below).

cases of fire, and conceals an automated external-sunshade system.

A single bay of the facade spans about 4 feet (precisely 1.25 meters), which affords economical space planning inside. "It is a standard measurement for a two-bay-wide office, which developers here love," says Wegener. "Sometimes it results in an awkward facade proportion," he adds, but M60 indeed cuts an elegant figure. Inside this dazzling wrapper, white-concrete terrazzo includes aggregate in hues of emerald, charcoal, and salmon. The simple office levels—planned with structural columns centered every 20½ feet (6.25 meters) around a compact core—can be easily divided in half and have been minimally fitted out while they await lessees. The ground floor will accommodate a restaurant and retail spaces.

It will be a while, though, before Die Macherei is completed and the streetscape fully activated—Sauerbruch Hutton's is the first building of the master plan to open its doors. But, even as work remains, M60 signals what's ahead and shows that even economical forms can pass with flying color. ■

Credits

ARCHITECT: Sauerbruch Hutton — Matthias Sauerbruch, Louisa Hutton, David Wegener, Mareike Lamm, Ilona Priwitzer, Marie-Sophie Starlinger, Alina Tapley, Lou-Salome Bienvenu, Aleksandra Wypior, Maria Silvestre, Mengyuan Cao, Marc Stellmach

ENGINEERS: Haustechnik Planungsbüro Schumacher (electrical, mechanical); Werner Sobek (structural)

CONSULTANTS: SINAI (landscape); HHP West Beratende Ingenieure (fire safety); Müller-BBM Building Solutions (building physics)

CONTRACTORS: Hirsch & Lorenz Ingenieurbau (shell); TM Ausbau (interiors); Medicke (facade); Rud. Otto Meyer Technik (m/e/p)

CLIENT: Art-Invest Real Estate Management

SIZE: 112,395 square feet

COST: withheld

COMPLETION DATE: September 2024

Sources

CLADDING: NBK Keramik (ceramic)

DOORS: Domoferm (metal); Schörghuber Spezialtüren (wood); Feuerschutzvorhang SIMON PROtec Systems (fire-control)

HARDWARE: Winkhaus Gruppe, dormakaba Deutschland

FLOORING: Casalgrande Padana (tile); Lindner (raised flooring)

LIGHTING: XAL, Wetec

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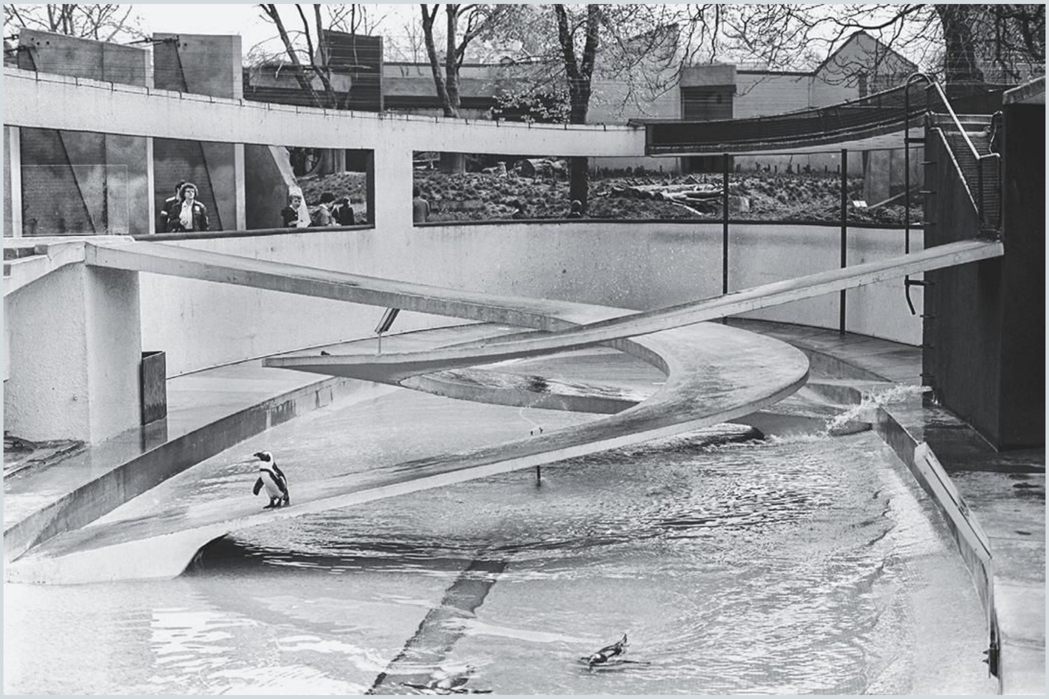

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John Ochsendorf
Professor of Civil and Environmental Engineering, MIT
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Anne Whiston Spirn
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To Make *The Brutalist* Monumental, Creators of the Film Approached Cinema as Architecture

BY DANTE A. CIAMPAGLIA

A HULKING horizontal mass of gray concrete stands sentry on an eastern Pennsylvania hilltop, an imposing citadel in an otherwise bucolic expanse. Conceived by a local millionaire and designed by a Hungarian architect, the building is intended as a community center and church. Its facade is stark and unadorned; its interior spaces, many subterranean, are claustrophobic, even the ones with soaring ceilings. A cut in the roof projects a cruciform beam of light onto its marble altar, a flash of relief in this otherwise forbidding, severe piece of Brutalism.

This architectural fantasy, the Institute, is the physical center of gravity in *The Brutalist*, a 215-minute cinematic epic of midcentury America, the postwar immigrant experience, and the practice of architecture, directed and cowritten by Brady Corbet and opening nationwide this month. The film's emotional core is László Tóth, played by Adrien Brody, a Bauhaus-trained architect who escaped the Holocaust and struggles with his trauma and dislocation after settling in Philadelphia amid class and racial tensions. He's ultimately commissioned to build the Institute by Harrison Van Buren (Guy Pearce), a wealthy industrialist who becomes László's problematic patron. László is eventually joined in the U.S. by Erzsébet (Felicity Jones), his wife and protector, and also a survivor of the camps. Told in two acts broken up with a rare intermission, and spanning the years 1947 to 1960, the film is big: in length, scope, and drama. But it's also restrained, with quiet scenes of achievement and despair doing as much heavy lifting as bombastic moments of triumph and defeat.

Maximal and minimal, hopeful and cynical—the narrative impulses of *The Brutalist* map neatly onto the contradictory forces of Brutalism. That's not accidental. In their seven years' working on the film, Corbet and his team steadfastly committed to approaching *The Brutalist* as architecture. The film—as much about László's struggling against an antagonistic society as it is his creating a building—needed to "reflect the Brutalist method" as much as possible, the director says, an edict that influenced every aspect of production.

László Tóth designing the Institute (top), and standing with his wife, Erzsébet (this image), as his patron, Harrison Van Buren, breaks ground.

Take the score. Corbet says he wanted composer Daniel Blumberg to create it out of "slabs of sound," the way Brutalists used slabs of concrete. At times this manifests cacophonously: as László maneuvers from the deepest hold of a ship bringing him to America, an avant-garde orchestra discordantly tunes up, settles into a more methodically rhythmic yet menacingly off-kilter tempo, comes into alignment; then, as he emerges onto the deck and sees the Statue of Liberty, it exults, in a soaring, triumphal blast. Elsewhere, the music is more quietly "slabbed"—László sketching the Institute in solitude as a minor-key piano on top of a low-rumble brass note with metallic clinks and plinks and other dissonant thunks subtly lurk in the background. It's an approach guided by layering tones and obsessing over materials. "We didn't want excess ornamentation,"

László explaining his Institute plans (top) and inspecting Carrara marble (this image).

Blumberg says. “We were drawn to the piano for various reasons, one of which is the acoustic potential of a huge instrument with many hammers. But we were particularly drawn to the prepared piano, where you interfere with the strings by sticking objects inside, like screws.”

Such physicality is also found in how cinematographer Lol Crawley shot the film. He used the archaic and unruly VistaVision system, created in 1954 but not used for an American feature since 1961, to generate a large, enveloping canvas. A VistaVision camera pulls 35mm film through its aperture horizontally rather than vertically—resulting in a more monolithic shooting experience—and uses twice as much stock, creating a richer, more sumptuous image with an increased field of view that gets us closer to the characters and deeper into their world. Editor Dávid Jancsó then shaped the footage, guided by Corbet’s production challenge. “The clean, geometric precision of Brutalist architecture influenced the cutting patterns, with long, unbroken shots interspersed with sharp, abrupt cuts, creating a rhythm that reflected the tensions in László’s life,” he says. All of this was useful in evoking the film’s period and forging an immersive and intimate viewing experience. And it was crucial to actualizing the concrete heart of the film.

Created by production designer Judy Becker, the Institute needed to exist as both a physical reality and a visual manifestation of László and Erzsébet’s Holocaust experience. We learn during an epilogue set at the 1980 Venice Architecture Biennale that László’s plans for the Institute—two bunker-like buildings connected via underground passageways—not only satisfied Harrison’s demand for a Christian space but also, subversively, monumentalized his and Erzsébet’s captivity as Eastern European Jews. This informed Becker’s research, which included concentration camps, chapels like Tadao Ando’s Church of the Light, the Harry Weese–designed metro stations in Washington, D.C., projects from the earthworks art movement, and eco-structures. And, while she says she deliberately avoided referencing any existing architecture, it’s hard to look at her building and not see Marcel Breuer’s influence: the Westchester Reform Temple and its Star of David–shaped roof, the shape of the Atlanta Central Library, the folded concrete of his St. John’s Abbey Church. Indeed, if there’s one real-life inspiration for László, it’s Breuer. Both Hungarian emigres; both trained at the Bauhaus; both makers of tubular furniture.

“I designed the Institute in a way so whoever entered it would be going down a really steep set of stairs that narrowed at the base into a very low-ceilinged central hallway,” Becker says. “What I would think of as the barracks are on either side, and those became function rooms in the community center and were divided by sliding doors. When those doors were closed, the rooms were the same proportions as the ones that László and Erzsébet would have been imprisoned in.” Her Institute is, in its way, suffocating, but Becker also created moments of relief. The building itself has a raised section shaped like a cross, while the community rooms and church have very high ceilings. “And then, finally,” she adds, “when you exit the whole Institute, it opens up into a wide staircase and exits out into a beautiful view.”

Moviegoers see very little of this. The Institute is only completed three hours into the film, and even then it’s never fully operational. Yet we’re placed in built exteriors and interior sets enough to appreciate what’s happening. The layered cinematic volumes—score, cinematography, editing, production design—solidify into a space that’s alive and quintessentially Brutalist, inspiring both awe and dread, inside and out. And the Institute, in turn, serves as a narrative slab, one of many that form this monumental, ominous, confident film.

The Brutalist is a singular cinematic statement on the role architecture plays in our culture, one that treats the discipline more seriously and humanely than maybe any other film. It’s an achievement that could only have been reached by Corbet and his team’s embracing Brutalism, its methods, and all its contradictions—and by insisting on approaching cinema as architecture itself. ■

PHOTOGRAPHY: © LOL CRAWLEY

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Architectural Record is now accepting submissions for the annual **Kitchen & Bath** competition. This special section highlights novel approaches to these utilitarian spaces, which can range from commercial and residential contexts to public infrastructure.

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commercial.schlage.com

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gouxstudio.com

Hey

This group of minimalist brass handles for windows and doors from Manital has a hot-forged base with a keyhole-like side profile and incorporates intricate lever ornamentation. The collection comes in a variety of styles and finishes, making it suitable for both commercial and residential use.
manital.com

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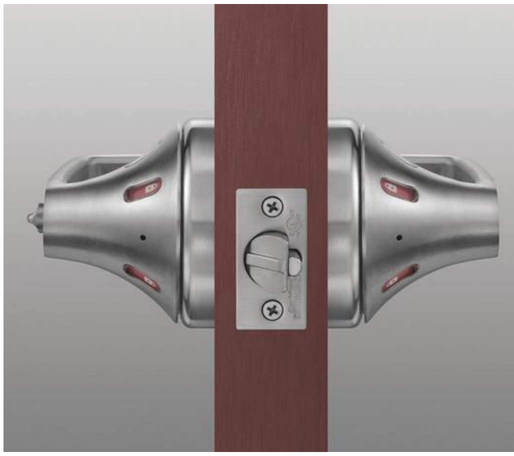
corbinrusswin.com



Terrace

Terrace is one of four home-hardware collections resulting from a collaboration between Brandt Collective and Copenhagen-based Norm Architects. It takes inspiration from classical Rome and Art Deco architectural elements, turning utilitarian objects like handles and pulls into striking statement pieces.
brandtcollective.com

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CONFERENCE AutoDesk University

BY LEOPOLDO VILLARDI

LAST FALL, nearly 12,000 building technologists, architects, engineers, manufacturers, and related professionals descended on downtown San Diego for AutoDesk University, the annual gathering organized by the eponymous developer of "design and make" technology.

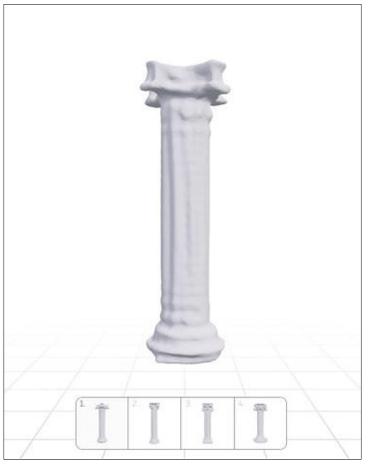
Among the exciting news items revealed: AutoDesk has become an official partner of the LA28 Olympic and Paralympic Games, and will undertake efforts to help Los Angeles host the summer spectacle by revitalizing infrastructure and upgrading venues without the need to build new ones. The three-day-long conference also had plenty to offer by way of workshops demonstrating new software and highly choreographed keynotes by industry leaders, with an expo floor, to boot.

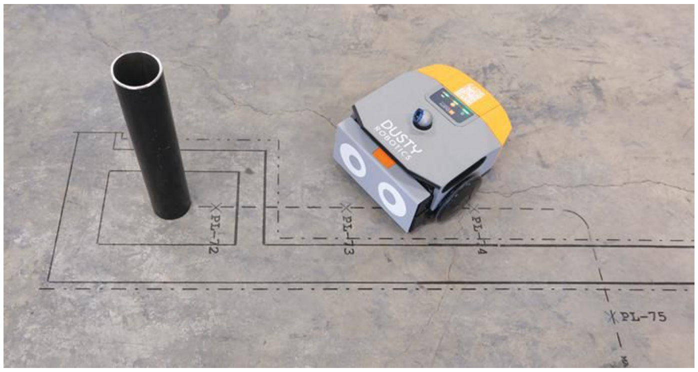
Following are the tools, presentations, and projects that caught RECORD's eye at this year's edition. ■

Project Bernini

Although not yet available to the public, attendees of the conference had a chance to test Project Bernini, AutoDesk's experimental generative-AI model. Using simple prompts —including text and sketches—it produces 3D objects. Pictured is one result created by typing "Corinthian column." Although Bernini (named for the Renaissance sculptor and architect) may need to spend more time studying the classical orders, given the two-word input, the limited data that the model is trained on, and its relative infancy, the output is astounding. It can't design a full-scale building either, but so-called "kit-bashers" and dabblers in architectural ornament may be interested in its capabilities.

autodesk.com

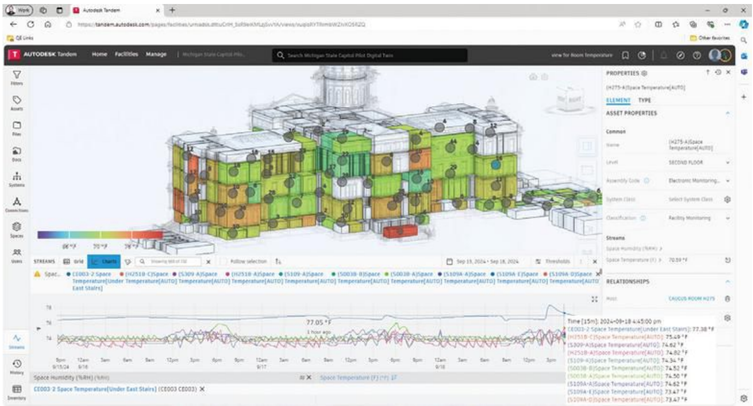




FieldPrinter 2

Architects spend a lot of time drafting—laboring over details, establishing hierarchy, organizing layers, and adding labels. But, in the hands of a sloppy builder, all that painstaking work quickly goes out the window. FieldPrinter 2 (nicknamed "Dusty") is a battery-operated robot that prints line work directly onto a job-site floor. Guided by a tripod-mounted laser, the autonomous unit delineates the location of walls and different materials to the nearest 1/16 of an inch, navigates around obstacles, and can print written instructions. What more could you want from a friendly robot with two cartoonish eyes?

dustyrobotics.com



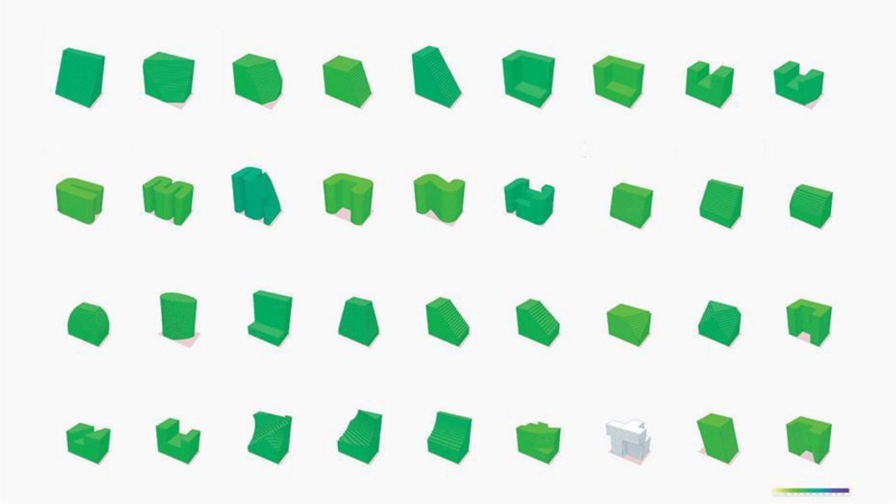
Tandem

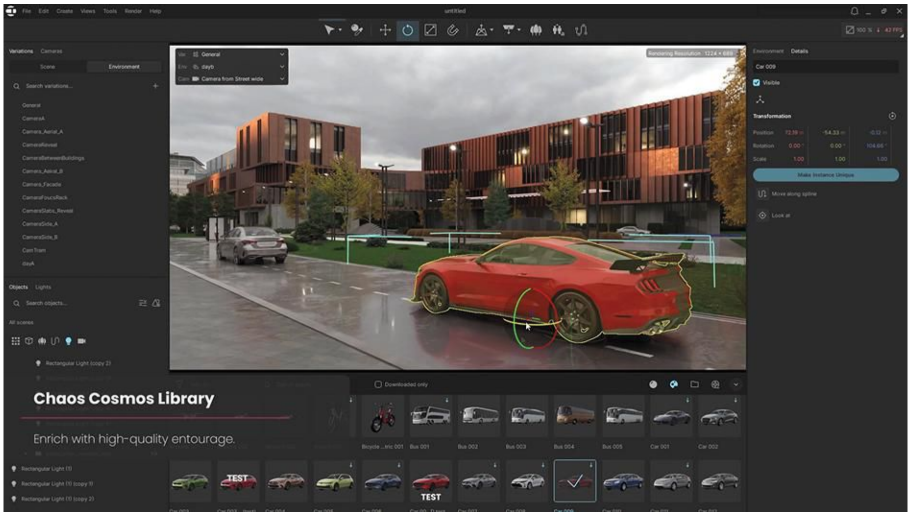
Building Information Modeling (BIM) has long set the standard for complex undertakings. Now AutoDesk Tandem allows design teams to transform detailed 3D models of their completed projects into so-called "digital twins"—virtual representations of physical buildings that use data to track performance in real time. Charles Thompson, an associate at Quinn Evans, explained how his firm's meticulous renovation of the Michigan State Capitol benefits from the software (pictured), which allows maintenance staff, architects, and engineers to visualize information gathered from sensors (such as temperature, humidity, and occupancy), mitigate leaks, and monitor the building's overall health. Especially fascinating is Tandem's "Warehouse View," which allows users to isolate elements, like windows or doors, and calculate how much space replacements might require in a storage facility prior to installation.

autodesk.com

Forma

Decisions made in a project's early phases can have long-term consequences, both good and bad. AutoDesk Forma, a cloud-based software tailored for concept and schematic design, allows architects to quickly geolocate models with real-world data. Its newly integrated embodied-carbon analysis tools are especially helpful in determining the most effective massing strategies, optimal orientations, and building materials to reach sustainability goals. Kevin Walsh, an architect at Nikken Sekkei, and Ellis Herman, senior product manager at Autodesk, illustrated how different forms—all with the same gross floor area and height cap—can be evaluated and color-coded to estimate final carbon footprint (pictured). Forma also easily connects with Revit, Rhino, and Dynamo for cross-platform workflows.
autodesk.com





Envision

Chaos, maker of the V-Ray engine and real-time virtual reality renderer Enscape, debuted Envision at AutoDesk University. This tool gives architectural-visualization specialists the ability to import textured models and quickly populate them with passing cars, walking and seated people, and procedurally generated flora, from an extensive integrated library. The software produces scenes that help architects relate narratives and offer clients the ability to better *envision* virtual spaces. Also worth noting: V-Ray 7's new Gaussian Splat feature, which easily renders large swaths of context, urban and rural, without the burdensome amount of processing power required by point-cloud models.
enscape3d.com

The Volterra Challenge

For nearly a decade, the Volterra-Detroit Foundation has partnered with Case Technologies, AutoDesk, and others to digitally reconstruct architecturally significant sites in Volterra, Italy. Most recently, the foundation has explored the gamification of these efforts, using Epic's Unreal Engine to render the city's Roman theater. Within a virtual environment, participants move through and around present-day ruins (pictured, captured by LiDAR) and, after reaching certain checkpoints, travel back in time to perambulate the theater as scholars believe it originally looked. Balancing "artistry with historical accuracy" is a key challenge, said technologist Brey Tucker, who practiced architecture earlier in his career and spearheaded this latest effort. It's a fascinating investigation of video game technology in the service of research, education, and historic preservation.
volterra-detroit.org

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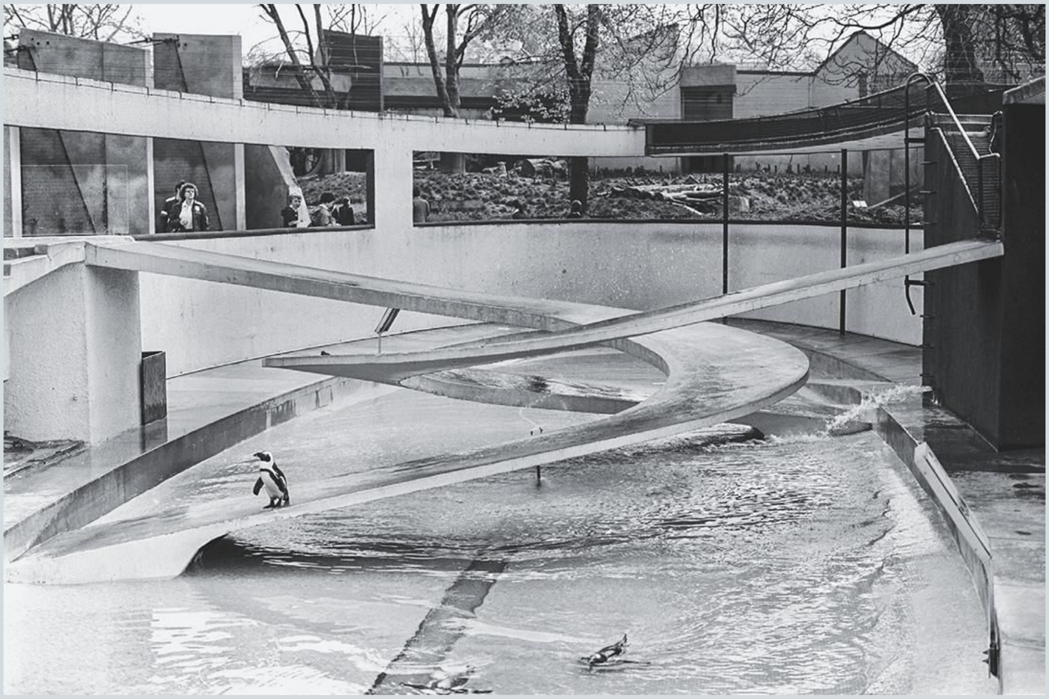

A PAIR OF INTERTWINED CONCRETE RAMPS FORM THE CENTERPIECE OF THIS PATH-BREAKING ANIMAL HABITAT, A HOME FOR PENGUINS AT A MAJOR EUROPEAN ZOO. DESIGNED BY AN ÉMIGRÉ FROM THE SOVIET UNION, THE CURVED STRUCTURE HELPED INTRODUCE MODERNISM TO A SKEPTICAL PUBLIC—AND ILLUSTRATED ITS THEATRICAL POTENTIAL. THOUGH ITS AVIAN INHABITANTS HAVE SINCE MOVED TO LARGER AND SANDIER QUARTERS, THE BUILDING REMAINS A PRIME ZOO ATTRACTION.

The Hagia Sophia, a Byzantine landmark in the heart of Istanbul, was designed by **Isidore of Miletus and Anthemius of Tralles**. Completed in 537 for the emperor Justinian I, the former church is known for its soaring masonry dome, which, despite having collapsed several times in the centuries after its construction, remains among the largest and most impressive in the world.

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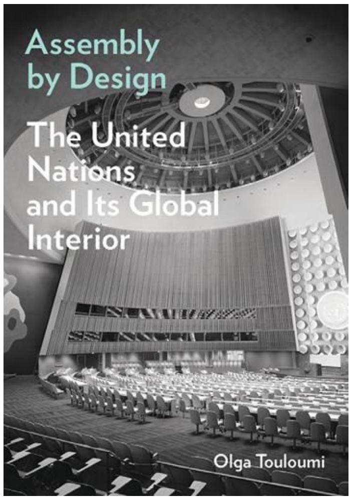
Assembly by Design: The United Nations and Its Global Interior, *by Olga Touloumi. University of Minnesota Press, 294 pages, $35.*

REVIEWED BY ANTHONY PALETTA



THE TYPICAL tale of the design of the United Nations Headquarters in New York as a World Cup match between Le Corbusier and Oscar Niemeyer—refereed by Wallace Harrison—is one that leaves both key players and details out of the story. This is the case convincingly made by Olga Touloumi in her new book, *Assembly By Design*, which challenges the "artificial" nature of the accepted history surrounding the construction of the UN. Who is on her expanded credit list? Not the other architects on the so-called Board of Design, who, as it turns out, didn't do all that much. Instead, there were numerous bureaucrats and technical advisors whose fingerprints are all over the complex.

The core of Touloumi's account is the United Nations' fretful fixation on carefully managing its physical debut to the world. There was no precedent—there had *never been* a UN headquarters—and the organization was intent on presenting as carefully curated a public image as possible. How the complex might appear from the FDR Drive was not the UN's primary interest. Rather, the organization focused obsessively on how its interiors would look through a camera's lens—the only view into the building that most of the world would ever have. Major television networks were consulted to plot out what were effectively televisual stages long before a single pier was ever poured.

Conceived in the aftermath of the Second World War, the UN had specific ideas about the kinds of spaces they did not want to build: no domineering rostrums for despotic reverberations. The complex would feature round tables fostering calm, diplomatic conversations. This might seem like a simple brief, but it certainly wasn't. Round tables, although a perfect symbol for egalitarian discourse, collided instantly with the UN's impulse to present all that they might on camera (filming one inherently captures someone's back).

Touloumi's research reaches a level of impressive granularity in demonstrating the UN's preoccupation with this dilemma. The UN Headquarters' three principal council chambers were largely the work of Finn Juhl,

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Builder: Konoike Construction
Photo: Aaron Davis, Nakamoto Forestry

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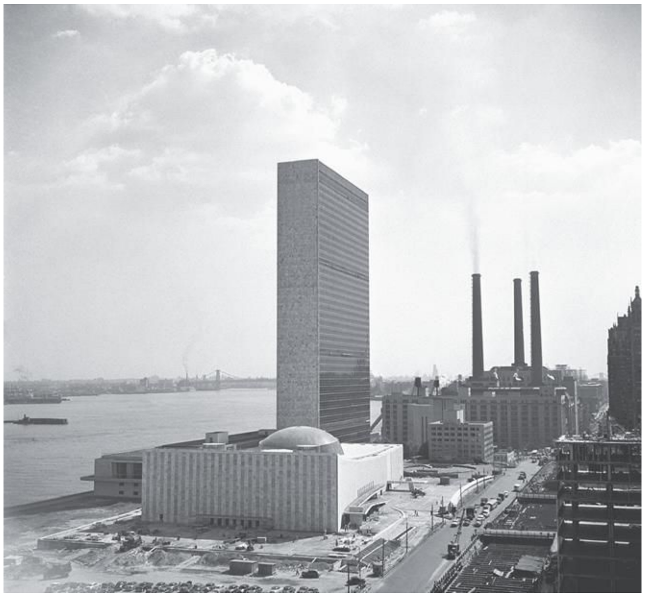
Sven Markelius, and Arnstein Arneberg—but they were not entrusted with the design of furniture. This work was allotted to Danish architect Abel Sorenson, who produced three different camera-friendly table designs, from a horseshoe for the Economic and Social Council to a parabola for the Trusteeship Council.

The selection of Scandinavian architects for the council chambers naturally resulted in a general mood of *hygge* (the Secretary-General at the time, Trygve Halvdan Lie, was Norwegian), but institutional acoustical and visual imperatives played a considerable role in further exaggerating such tendencies. As Touloumi writes, “architects would translate this desire for intimacy into lower ceilings, shorter corridors, a preference for carpets and wood, as well as curved walls.”

Touloumi, in dedicating great attention to acoustical planning of the complex, notes the prime irony that strenuous efforts were taken to shape spaces where many attendees couldn’t hear any given speaker. A conversation between the nations of the world is only possible with the scaffolding of translators, whose all-but-concealed roles manifested in IBM headphones at each seat. The setting was unitary, but comprehension was atomized—“collectivized isolation,” as Touloumi puts it.

The UN’s meticulous stage design, she also points out, extended to a rather deliberate effort to conceal the most consequential branch in the organization. Most government complexes trumpet the placement of their most powerful bodies; the United Nations deliberately hides its own. The



An exterior view, taken in 1952, of the United Nations Secretariat and General Assembly Building in Manhattan.

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General Assembly is foregrounded as the icon of the complex while the Knights of the Round table—the Security Council—hide amid the otherwise fairly toothless council chambers. Le Corbusier, with a certain ineradicable tendency toward programmatic honesty, wanted to express the Security Council more clearly, structurally. The organization did not. The process, Touloumi explains, was “the tactical use of global interiors that created an idealized fiction of egalitarian and collaborative diplomatic practices at the United Nations.”

The Board of Design’s intrinsically advisory role was dramatized by its dismissal after four months; the UN did not keep architects around for any actual building. This note of semi-superfluity continues in Touloumi’s accounts of subsequent UN structures—including the UNESCO headquarters in Paris. Each enlisted different combinations of architects; all ended up much the same in plan.

If there’s any criticism to be leveled against *Assembly by Design*, it’s that, for all the invaluable technical and institutional context the book brings to light, it leaves a certain void. There simply isn’t a comprehensive general history of the design of the UN complex, an accomplishment this book might have quite easily achieved. Touloumi leaves little doubt that Le Corbusier and Niemeyer receive more credit than they deserve, but greater detail on just what they were up to—as well as Harrison’s patient mediations—would have been welcome.

The sheer depth of Touloumi’s archival wrangling and her synthesis of content across fields and languages in explaining the 20th century’s (still standing) Tower of Babel is impressive. In simply explaining the UN’s image-management through the architectural tool of the plan, she hopes the overlooked stories in her book might provide inspiration to “move together toward more just and open structures of assembly.” ■

Anthony Paletta is an architectural writer based in Brooklyn, New York.

Beyond the Envelope: Twenty-one Pioneering Architectural Projects from the Early Twenty-first Century, Twenty-one Interviews with Their Architects, *edited by Tom Verebes. Oscar Riera Ojeda Publishers, 288 pages, $65.*

REVIEWED BY KATHARINE LOGAN

IF YOU COULD invite 21 of today’s most brilliant architects to dinner, who would they be? And if you seated each luminary between a pair of architecture students primed on one of the architect’s most significant works, what conversations might you overhear? Short of actually holding that imaginary gathering, *Beyond the Envelope* is as close as most of us will get to hearing, for example, Pritzker Prize–winner Wang Shu discuss modernity and tradition in the construction of the Ningbo Historic Museum; AL_A director Maximiliano Arrocet describe “sculpting with shadows” to design Lisbon’s Museum of Art, Architecture and Technology; or Sir

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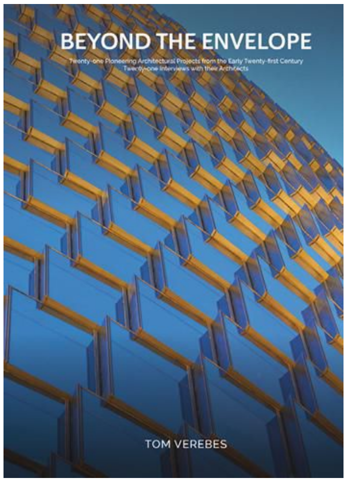
Peter Cook range from the functionality of the nozzles on Kunsthaus Graz to his interlocutor's taste in shirts, all in one place.

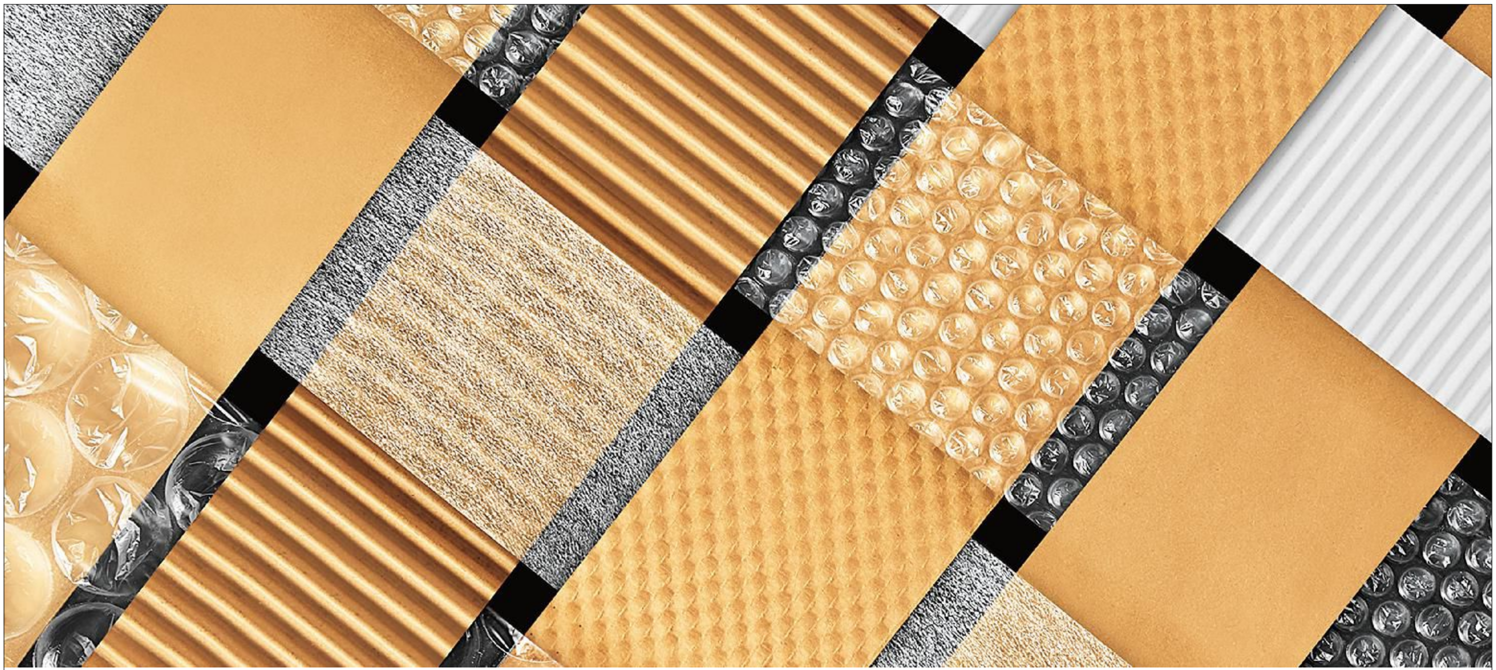
The book's candid, insightful, and sometimes revelatory interviews were conducted online by final-year master of architecture students in a building-envelope course at New York Institute of Technology, between 2021 and 2023, and broadcast as part of the school's program of public events. Edited and introduced by the students' instructor, architect Tom Verebes, each interview focuses on a single building, notable for its innovative envelope. Professional photographs (principally by RECORD contributing photographer Iwan Baan and London-based Hufton & Crow) and student-generated graphic analysis complement the interviews and generate "aha" moments throughout.

Six themes organize the projects. The first four—form, matter, identity, and environment—are self-explanatory. They include among their examples OMA's reinvention of the skyscraper in CCTV Headquarters in Beijing, Reiser + Umemoto Architecture's play of mass and porosity in O-15 Tower in Dubai, Herzog & de Meuron's reuse of a historic police station in Tai Kwun Centre for Heritage and Art in Hong Kong, and the evolution of passive cooling and ventilation in Foster + Partners' 30 St. Mary Axe, London.


BEYOND THE ENVELOPE
Twenty-one Pioneering Architectural Projects from the Early Twenty-first Century
Twenty-one Interviews with their Architects
TOM VEREBES

The remaining two themes—experience and interaction—benefit from Verebes's introduction. Experience pertains to the atmosphere, mood, or emotive impact that the building envelope achieves through such effects as light or mediated graphic design, he writes. Illustrating this, Galleria Centercity (UNStudio), with its electronic-screen envelope, generates a sense of dynamism and evanescence that belies the building's stasis. The sixth theme, interaction, pertains to envelope-integrated technology such as sensors, robotics, and actuating systems by which the architecture becomes responsive. The Shed (Diller Scofidio + Renfro), with its transformable envelope and volume, exemplifies this group. Themes overlap from building to building, and discussion of each project ranges across multiple categories.

Among the book's many highlights, this reader will be pondering in particular Wang Shu's insights into integrating technology and craft in the use of recycled and mixed materials, a practice that's increasingly needed worldwide. At Ninbgo, the process entailed inten-



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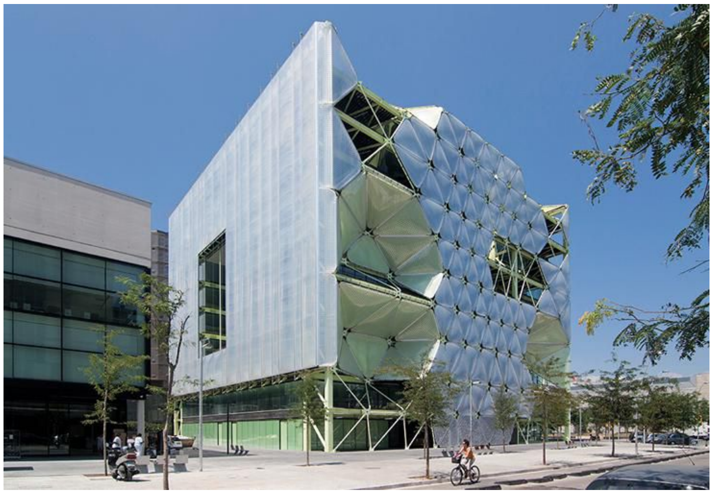

Cloud 9's Media TIC in Barcelona flaunts a facade of air-filled ETFE cushions and a bioluminescent exoskeleton (left).

sive research into craft workers' methods and iterative on-site communication with them, a large material-deposit yard on-site, photographs and computer technology to generate high-resolution elevation drawings, and 1:1 prototypes and mock-ups. "Construction cannot simply be done with drawings, nor by the craftsmen according to traditional habits," Wang says. "In fact, a whole new space has emerged between the two, a process that is both controllable and not entirely controllable." Embracing this hybrid condition of semi-control, he adds, "is not only about the saving of materials or resources, but also has a significant cultural meaning—that is, the restoration of memories, the preservation of time, and the preservation of the experience of time."

Also memorable are Enric Ruiz-Geli's no-excuses approach to net zero design at market cost and Kai-Uwe Bergmann's challenge to conventional zoning. Oh, and Jeanne Gang's take on mass customization. The list goes on.

Beyond the Envelope represents a significant contribution of firsthand accounts of some of this century's most compelling architecture—its ideas and processes. In addition to the insights shared, the warmth and directness of the book's dialogue format, structured by the students' carefully composed questions, make it an enjoyable read. Instead of that imaginary dinner party, consider this book as an invitation to take your lunch to a park, or order a glass of red at your neighborhood haunt, and dip into a rich conversation. ■

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10K HOUSE IN BARCELONA
BY TAKK

PHOTOGRAPHY: © JOSÉ HEVIA

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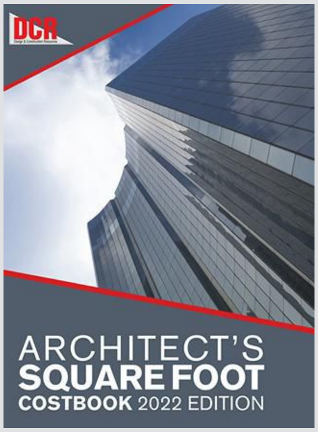
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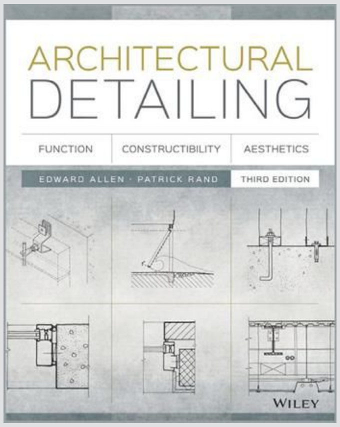
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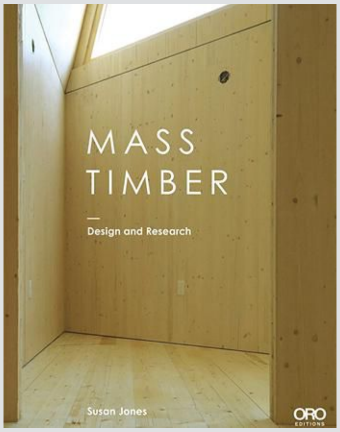
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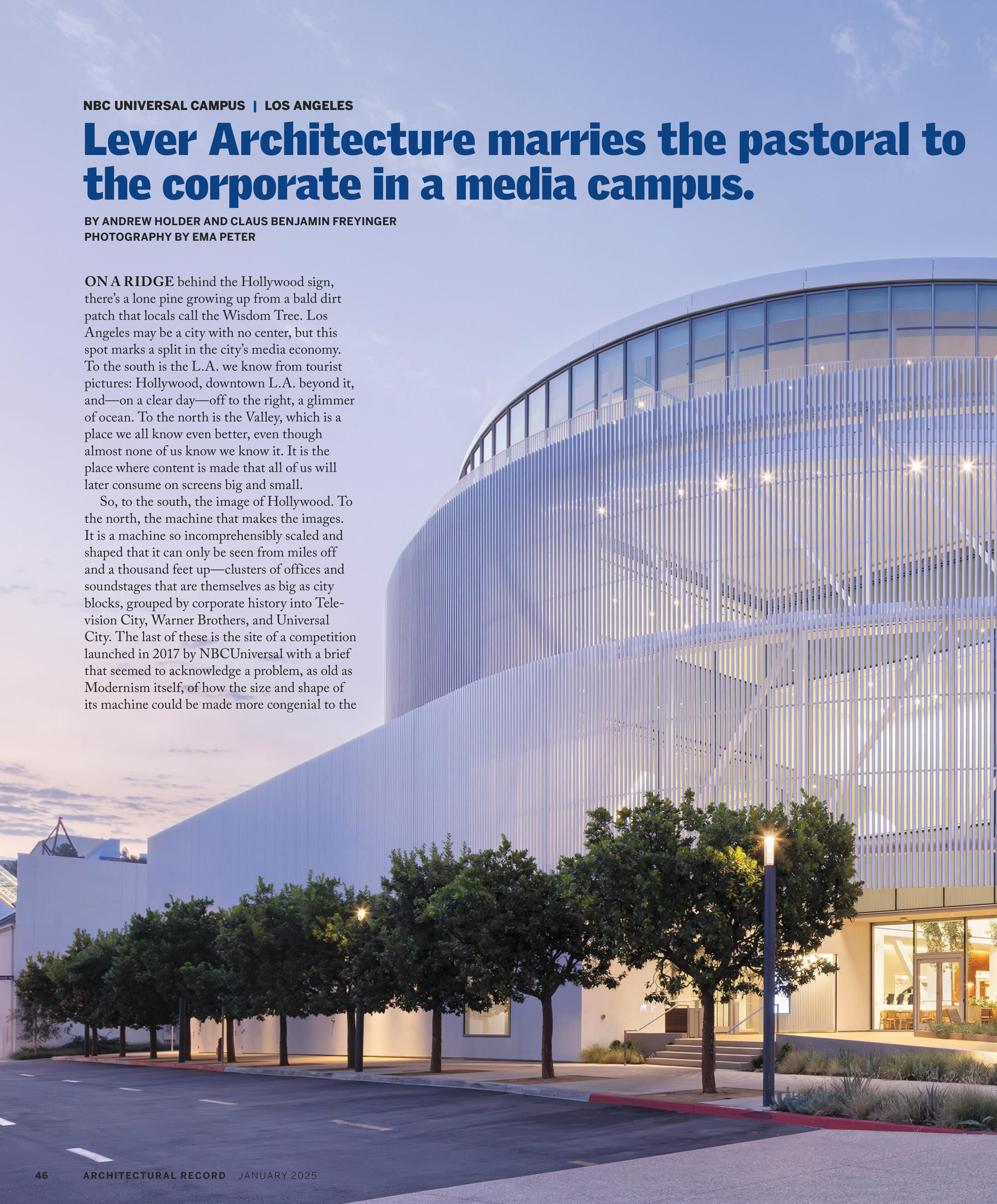
NBC UNIVERSAL CAMPUS | LOS ANGELES

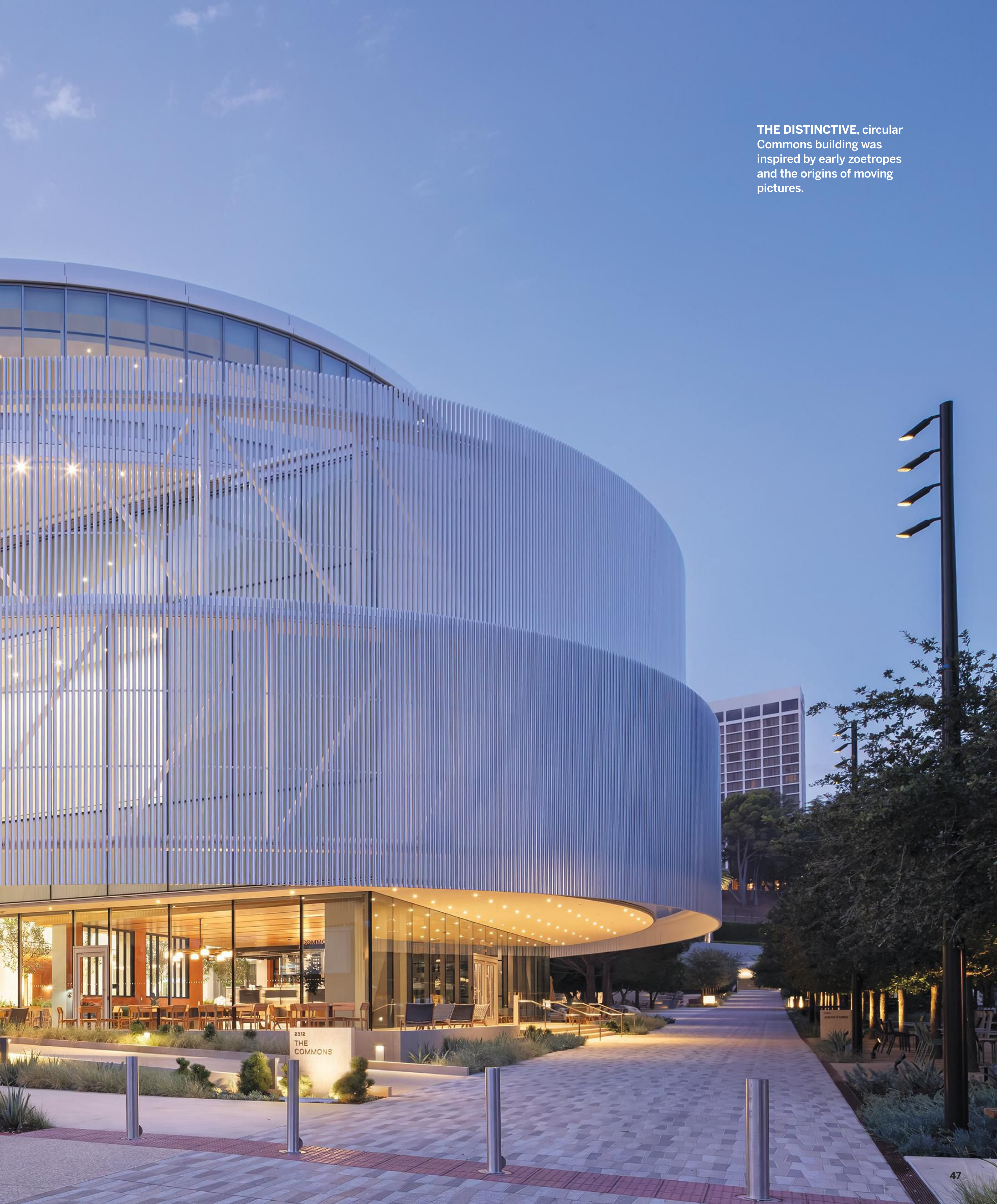
Lever Architecture marries the pastoral to the corporate in a media campus.

BY ANDREW HOLDER AND CLAUS BENJAMIN FREYINGER
PHOTOGRAPHY BY EMA PETER

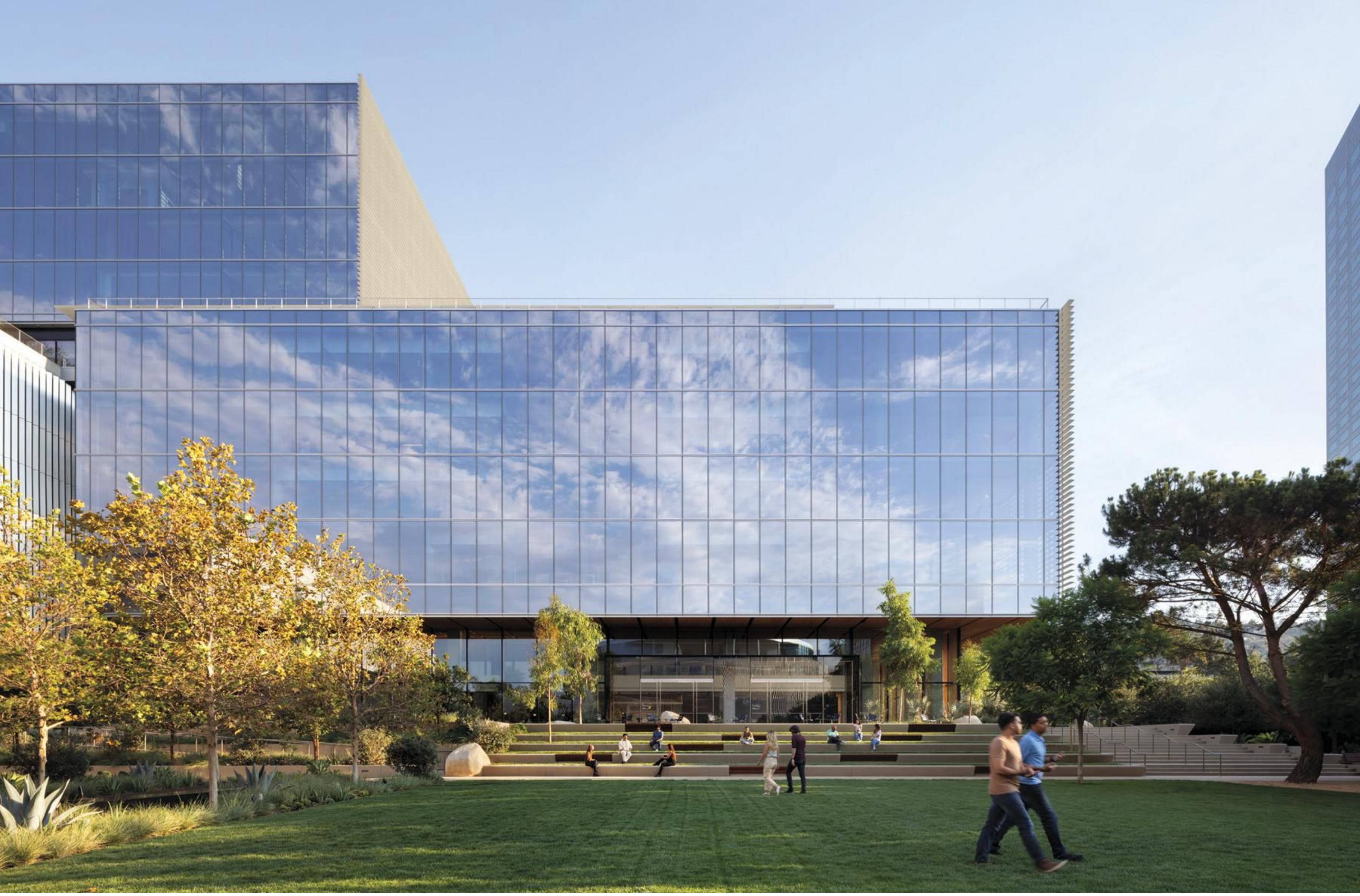
ON A RIDGE behind the Hollywood sign, there's a lone pine growing up from a bald dirt patch that locals call the Wisdom Tree. Los Angeles may be a city with no center, but this spot marks a split in the city's media economy. To the south is the L.A. we know from tourist pictures: Hollywood, downtown L.A. beyond it, and—on a clear day—off to the right, a glimmer of ocean. To the north is the Valley, which is a place we all know even better, even though almost none of us know we know it. It is the place where content is made that all of us will later consume on screens big and small.

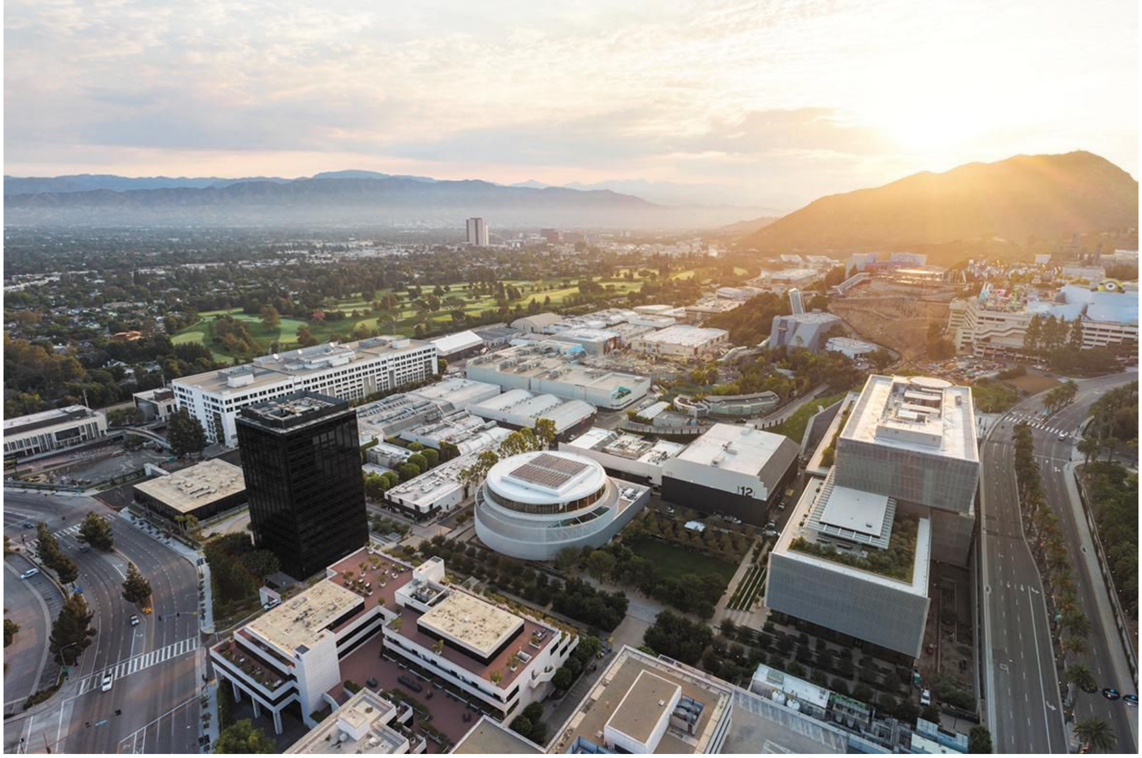
So, to the south, the image of Hollywood. To the north, the machine that makes the images. It is a machine so incomprehensibly scaled and shaped that it can only be seen from miles off and a thousand feet up—clusters of offices and soundstages that are themselves as big as city blocks, grouped by corporate history into Television City, Warner Brothers, and Universal City. The last of these is the site of a competition launched in 2017 by NBCUniversal with a brief that seemed to acknowledge a problem, as old as Modernism itself, of how the size and shape of its machine could be made more congenial to the




2312
THE
COMMONS

THE DISTINCTIVE, circular Commons building was inspired by early zoetropes and the origins of moving pictures.





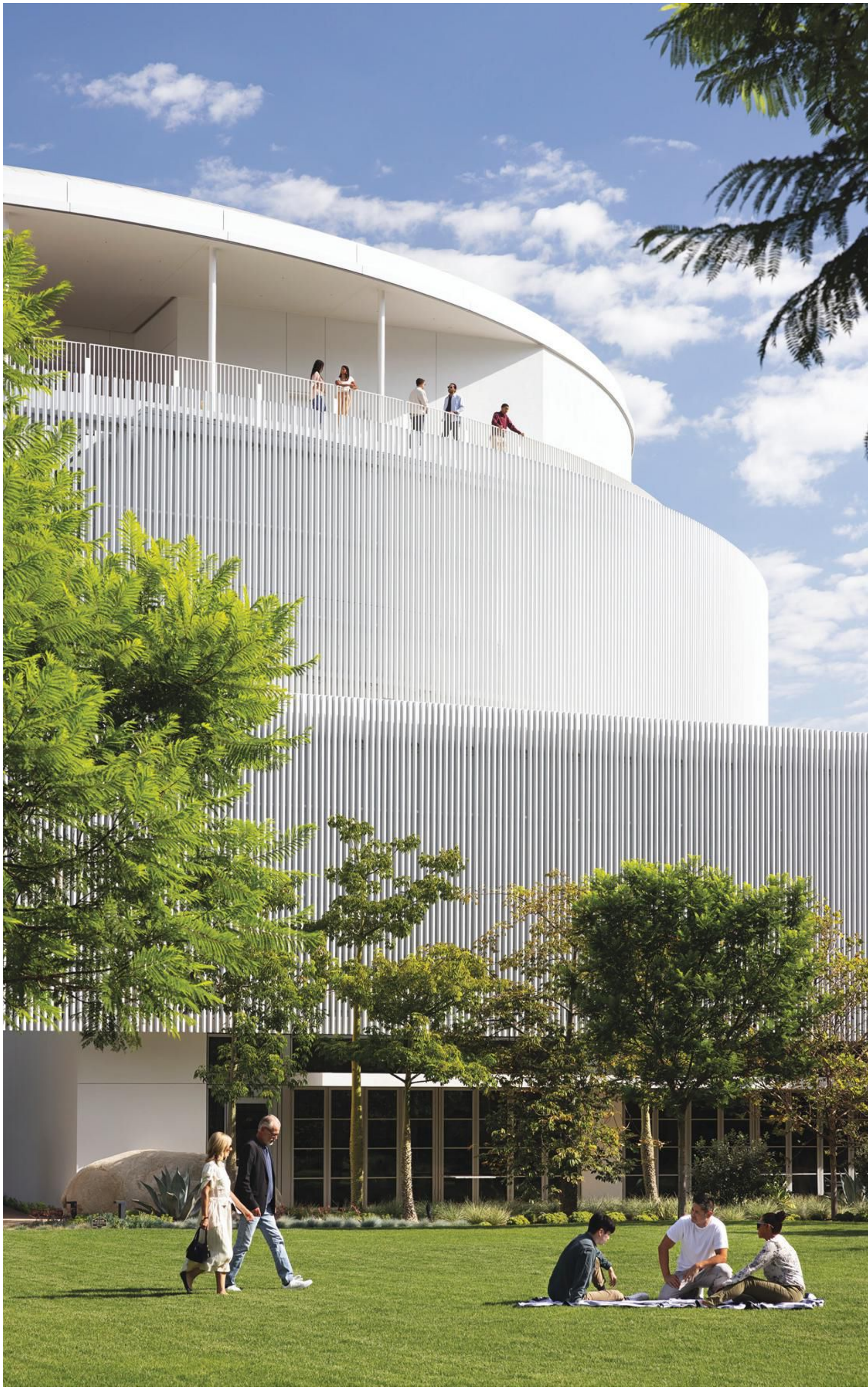
THE GLAZED One Universal (above) and luminous Commons (opposite) are connected via The Green and the pedestrian-oriented paseo (left).

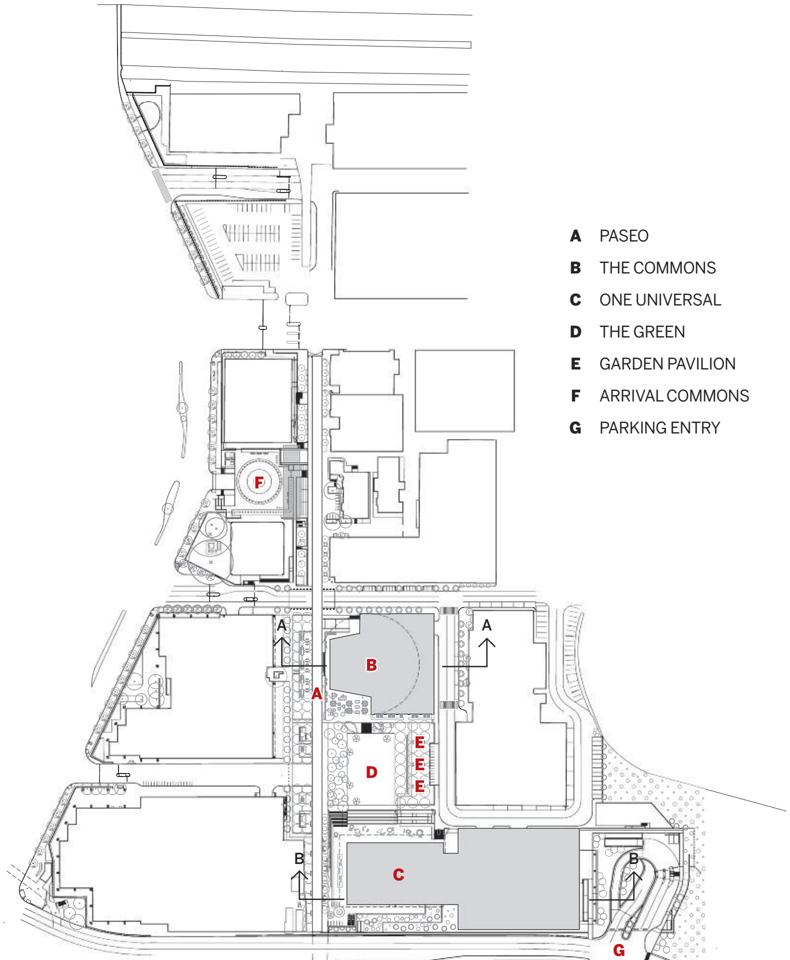
people who worked inside it. The campus was huge but had no obvious places to gather. Company employees were by definition creative, but the facility itself was seen as characterless and hostile to creativity. The machine and its inhabitants were at odds. How, the brief asked, could architecture intercede to make one fit the other?

A version of this imperative has produced the major works of Constructivism, Futurism, Metabolism, the British High Tech, and Deconstruction. The project completed at Universal City by Lever Architecture and the landscape firm Field Operations, the winners of the competition, models a new category worthy of inclusion on the list. We nominate it Corporate Pastoral.

The first rule of this mode is to make a space separate from the city but still connected to it. (The pastoral is not utopia. One must be able literally to reach it.) Lever and Field Operations accomplished this by remaking the western edge of Universal City, where it butts up against the rest of L.A. along Lankershim Boulevard. This used to be a ragged wall of buildings in no particular order—a black office tower and its flatter twin, some soundstages, and something like a mall joined by gates to the campus beyond. At the midpoint of this wall, the designers inserted a block-sized arrival zone around a circular fountain. As people leave their cars and transition to foot, they are lined up with an interior walk, called the "paseo," that runs parallel to Lankershim but works according to a completely different set of rules. Whereas the boulevard is car-based, open to the city, and transits a homogenous urban sprawl, the paseo is the inverse: it's mostly pedestrian, separated from the city in a canyon of buildings, and it transects an ingenious series of designed episodes on its run north to south. Near the arrival fountain there is a succulent border garden with a canopy of Palo Breas trees. Farther on is a zone of Western sycamores, a riparian tree species, among native grasses like *Bouteloua gracilis* planted between the two major new buildings of the project—first, The Commons, ringed in a white screen, filled with restaurants and screening rooms, with an event space and open terrace above; then, One Universal, an office building massed in glassy blocks.

The second rule of the Corporate Pastoral is to make an entire world in this newly separate space, following the logic of rural cultivation in lieu of urban commerce. Here that world is made by a shift in orientation. Although the paseo is plotted flat in plan, the relation of

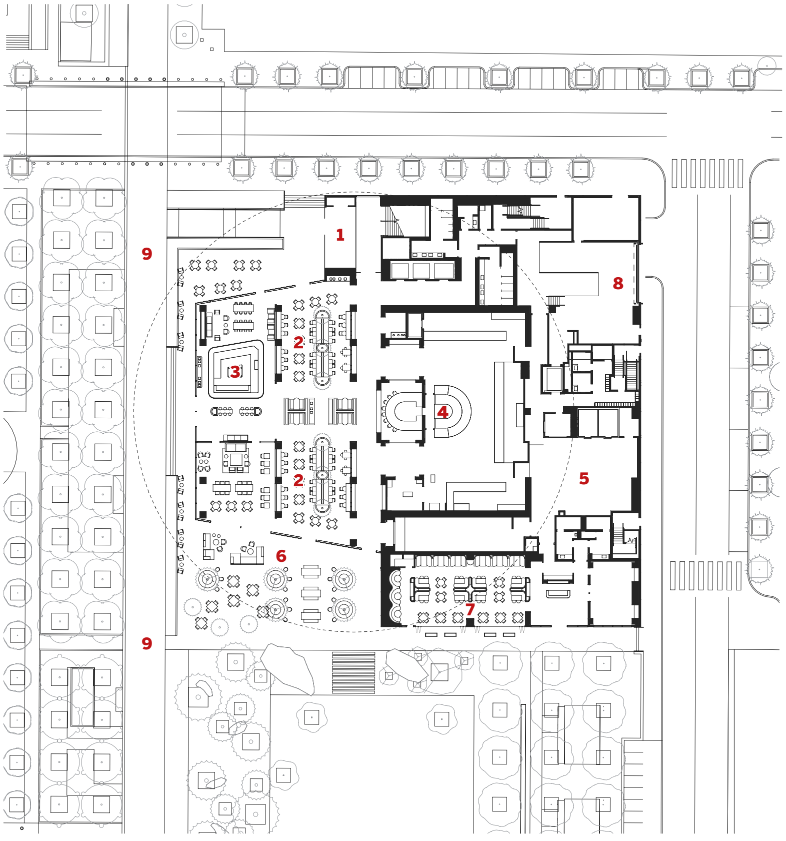




A PASEO
B THE COMMONS
C ONE UNIVERSAL
D THE GREEN
E GARDEN PAVILION
F ARRIVAL COMMONS
G PARKING ENTRY

SITE PLAN

0 150 FT.
50 M.



THE COMMONS GROUND FLOOR PLAN

0 30 FT.
10 M.

Credits

ARCHITECT: Lever Architecture

ARCHITECT OF RECORD: House & Robertson

ENGINEERS: WSP, Englekirk Structural Engineers (structural, One Universal); Thornton Tomasetti (structural, The Commons); AMA (m/e/p); Langan (civil); Shannon & Wilson (geotechnical); Gibson Transportation (traffic)

LANDSCAPE ARCHITECT: Field Operations

CONSULTANTS: Studio Shamshiri, AvroKO, Gensler (interiors); Atelier Ten (sustainability); Salter (acoustics); Horton Lees Brogden (lighting); Arup (fire safety); Thornton Tomasetti (envelope); Aurora Development (project management)

GENERAL CONTRACTOR: Hathaway Dinwiddie

CLIENT: NBCUniversal

SIZE: 84,000 square feet (The Commons); 350,000 square feet (One Universal)

COST: withheld

COMPLETION DATE: September 2024

Sources

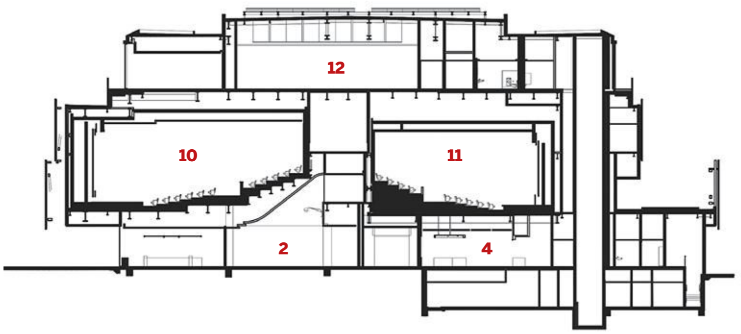
CURTAIN WALL: Kawneer, Arcadia

DOORS: Nanawall

HARDWARE AND ENTRANCES: CR Laurence

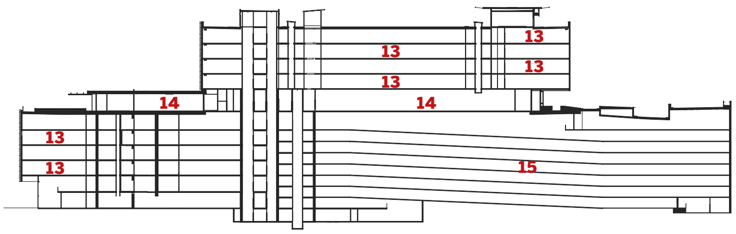
FIXED SEATING: Poltrona Frau

1 MAIN ENTRY
2 COMMISSARY
3 CAFÉ
4 SERVERY
5 KITCHEN
6 COURTYARD
7 GRILL DINING
8 LOADING
9 PASEO
10 THEATER
11 SCREENING ROOM
12 EVENT SPACE
13 OFFICE
14 FLEX FLOOR
15 PARKING



SECTION A - A THE COMMONS

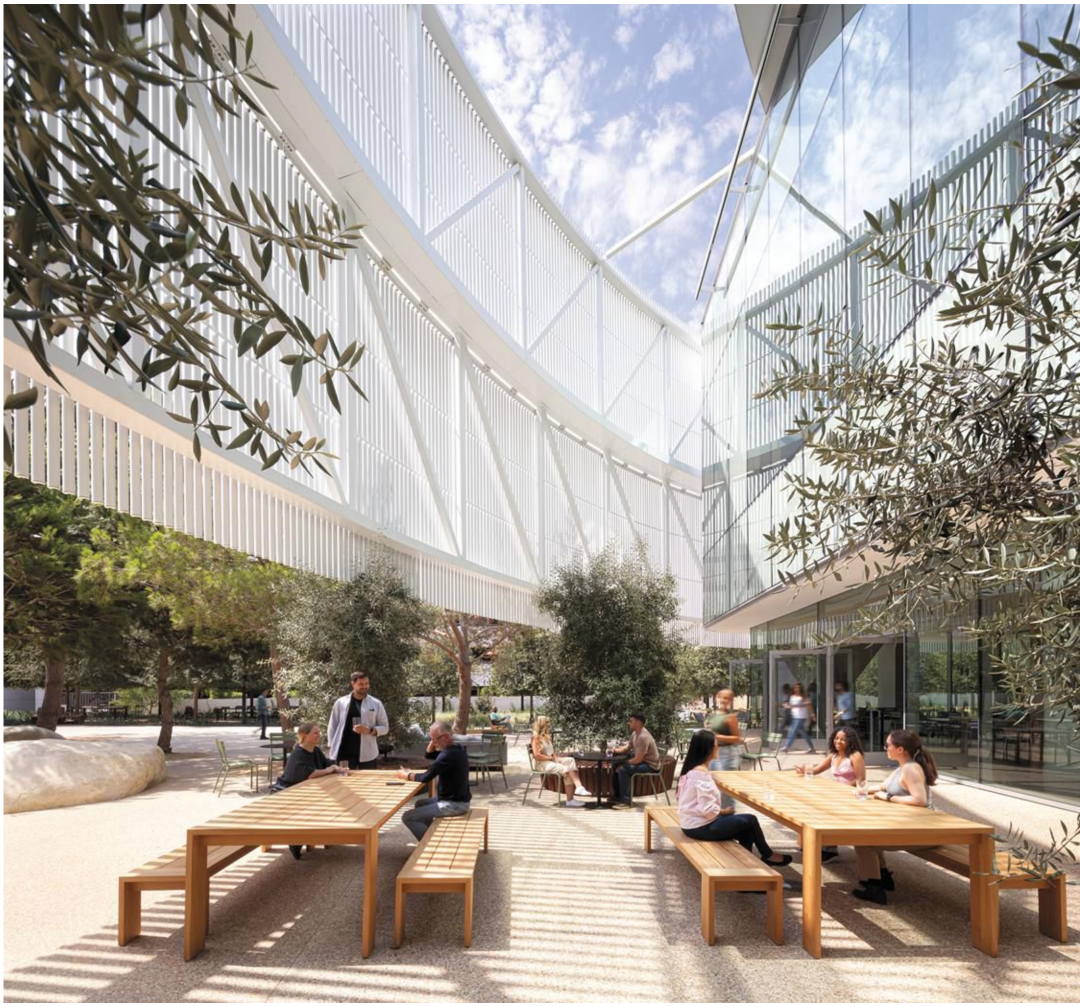
0 20 FT.
5 M.

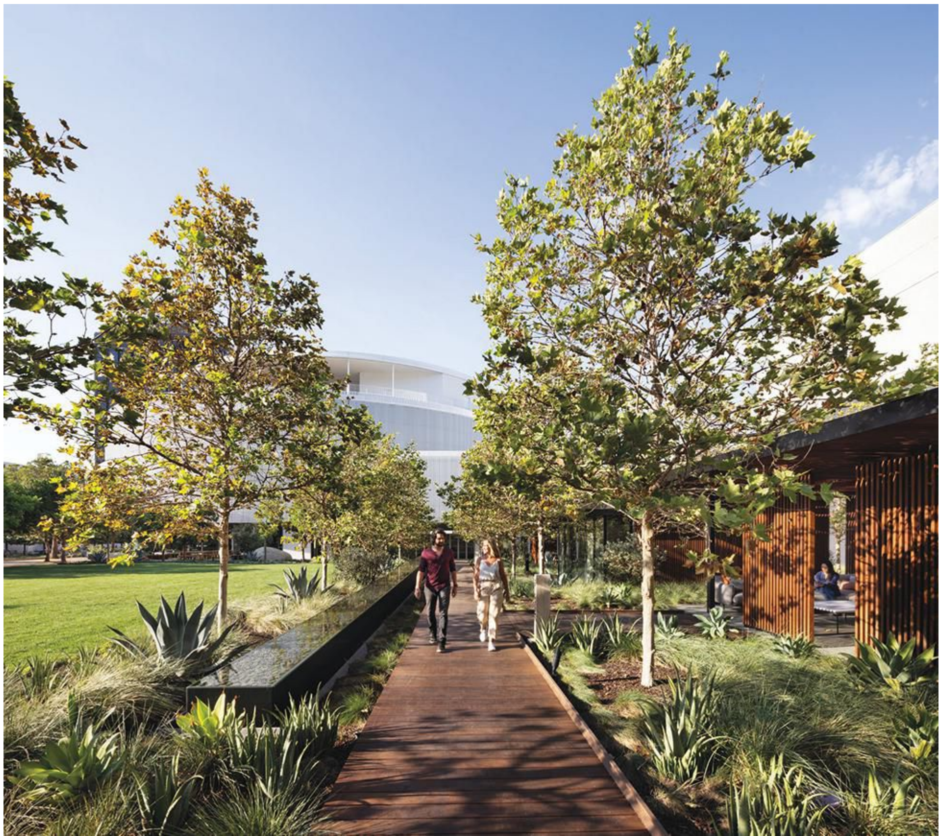


SECTION B - B ONE UNIVERSAL BUILDING

0 75 FT.
25 M.

A SUSPENDED circular scrim delineates various outdoor spaces (right). The paseo is a pedestrian path through the campus (below, right).





building to landscape makes the experience primarily vertical. Even as one traverses the distinct scenic episodes of the paseo, there is a stable order of three fundamental layers. The first of these, obviously, is the ground itself, which becomes an ethical statement. Ground here is productive, verdant, and good. A kitchen housed below grade underneath the Commons makes food for the campus catering system. The planting plan features a little generic lawn grass but is mostly species that thrive in the semi-arid conditions of southern California. The ground is not passively flat but modeled in low relief with a series of helpful articulations, like a broad ramp as the primary connection between the paseo and the Commons and a plinth of landscaped steps that rise up in increments to meet the lobby of One Universal and double as benches.

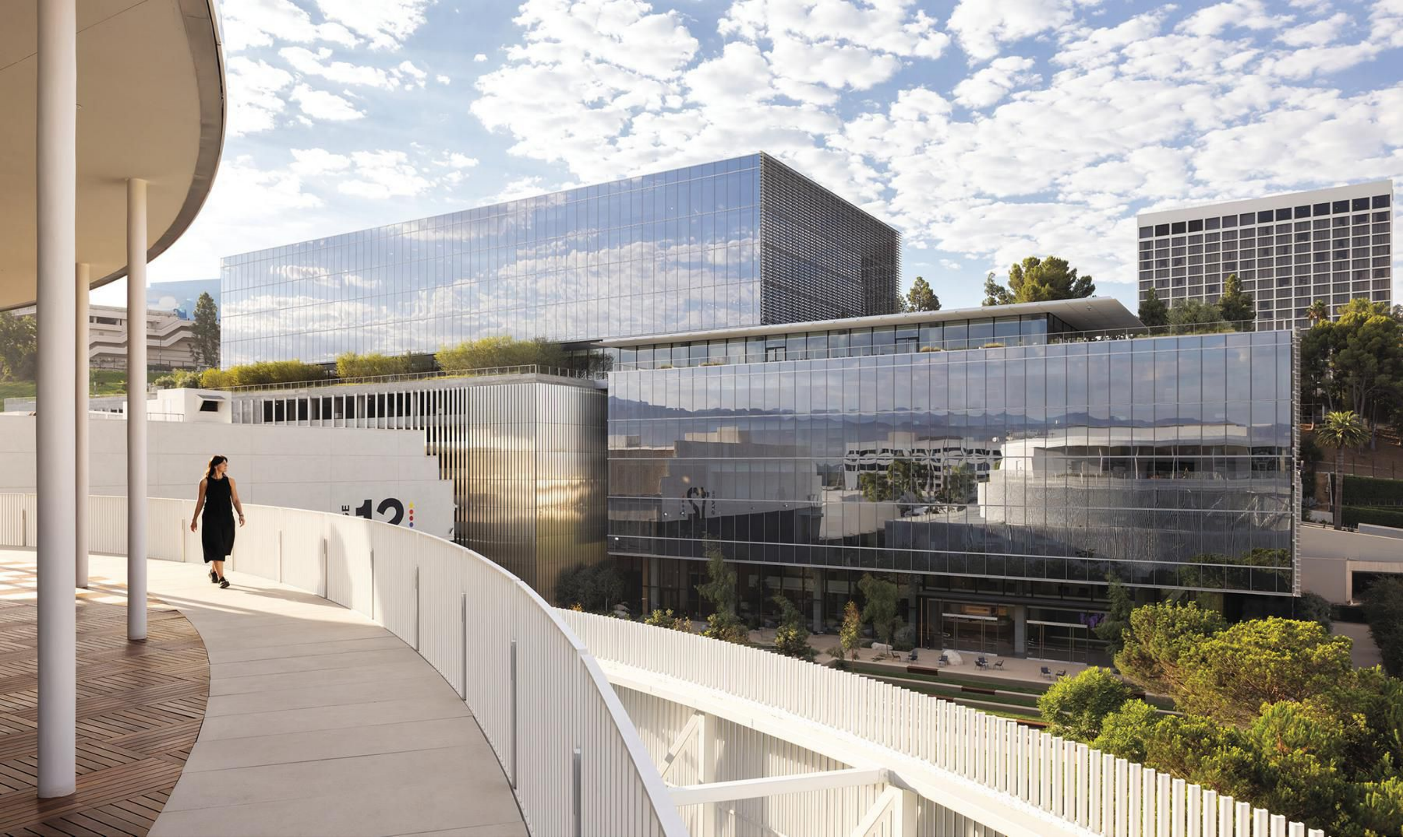
The second layer we can only call a horizon. It is perhaps strange to say that an enclosed campus would have a horizontal extension of view, but here landscape and building conspire to create one. The lobbies of both new buildings are handled in ways that extend views almost to their respective cores. At One Universal, the transparent lobby is pushed back under a projecting office block, while at the Commons a similar depth is made by suspending a circular "veil" outboard of the envelope. Between these buildings, tree canopies continue the ceilings of the two lobbies, so the horizon becomes volume with floor and lid—one scaled to human occupation but also to smaller, non-urban uses. The designers call the small-scale eating areas and social spaces at the edge, where the paseo touches major building blocks, "porches" and "verandas." A series of freestanding conference rooms are styled as pristine Modernist cabins nestled back from the paseo in taller grasses. Each of these devices in its way holds creative employment in an analogy to the almost-rural, to roaming, to casual repose, to the size of the body, to near-solitude and chance encounter.

Above it all is the sky, which begins around the second floor. At this height, the building skins no longer extend view but do sky-like, scene-making things. The north-facing elevation at One Universal is a mirror-like wall that grabs the sky's reflection and situates it as a backdrop. Expressed horizontals in the curtain wall system amplify the effect, banding the image in gradient layers. By contrast, the

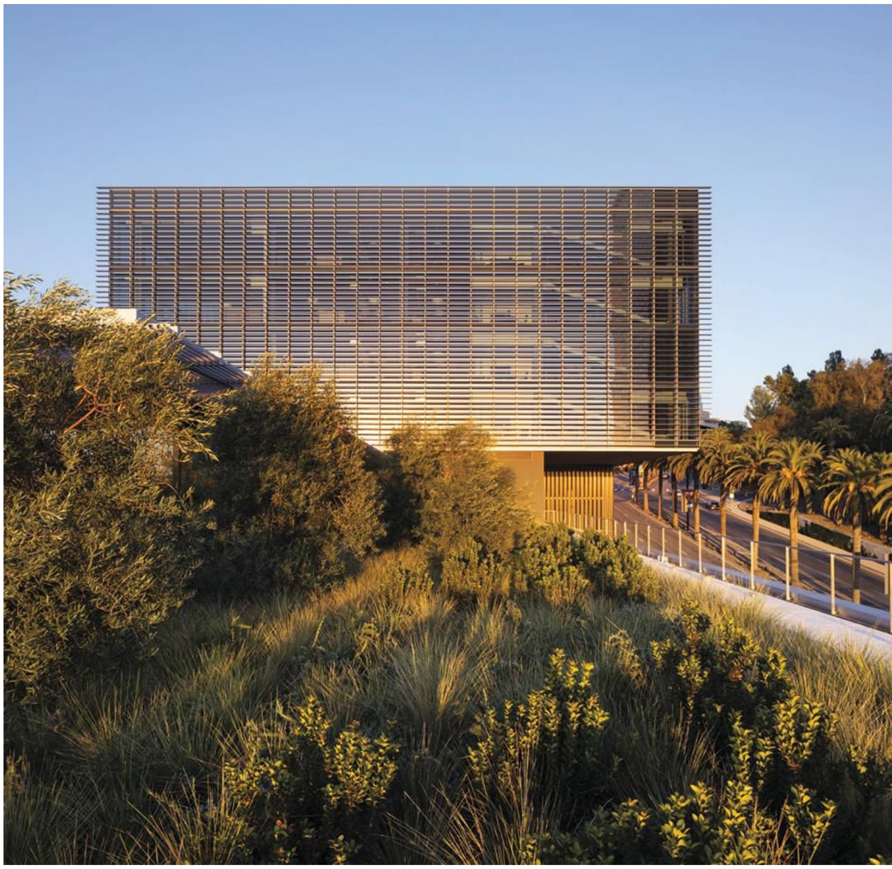
envelope of the Commons works more like an atmosphere, using a crescent-shaped cross section on the louvers to amplify shifts in light. In both buildings, the program at this stratum is ordered according to the logic of being "up" or deliberately removed from the open zone below. Private and more rarefied executive offices are here, as are state-of-the-art screening rooms. Handsome wood interiors are handled in slats or panels with broad spacing, as if to emphasize the delicacy of connecting, with details that are set in, hung from, or placed atop. At the very apex of the Commons, a terrace for special events befits a cloud top.

Ground, horizon, sky. It's an order more commonly found in paintings by Poussin, where urbane figures make music or converse on rural terrain against an azure backdrop, demonstrating that sophistication flourishes only when bracketed off from the literal presence of the city. Pastorals serve what they exclude. This is the contribution of NBCUniversal to the lineage of architecture that fits machine to human. It is not a machine in the garden, à la Corbusier's Villa Savoy. It is not Jacques Tati's *Playtime*, steel and glass of machine turned inside out. It is not British High Tech, which trades on the allure of machinery hidden behind implacable surfaces. Nor is it the version of the machine proposed by Rem Koolhaas/OMA on this same site for Universal before its merger with NBC, although that unbuilt scheme, despite its superficial differences, is the most relevant precedent. Like Lever and Field Operations, OMA pitched its work at the scale of an urban intervention. But it also equated creativity with a frisson of urbanity, which they would try to instill in the Valley sprawl. "Creativity needs an elusive dose of order and chaos, fixity and improvisation," OMA said, and proposed an entire city-in-a-building of four towers spanned by a beam of offices.

Now the mood has flipped. Cities? Too much disorder and disease. Creativity? It needs rest. Constructivism, High Tech, Deconstructivism, and other Modernism may have delighted in confronting the creative worker with the presence of the machine, but now the imperative is less violent, and, with this, the door has opened for Lever and Field Operations to enjoin a starkly different model. Instead of the theatrical, exteriorized urbanism of OMA's project, the incongruities of scale and form between human and machine at NBCUniversal are compressed to the management of edges. The projections and intrusion of the corporate works tend the edge of a pleasant scene,



THE CAMPUS has plenty of spaces for people to meet, including lobbies, lounges (opposite, both), and terraces (above). Louvers shade facades with greater solar exposure (right).



constructing its sky, opening a plenum for idyll, coaxing productivity from its ground. The order verges on cosmological. Companies tend their flocks. Only God above and the devil below are missing.

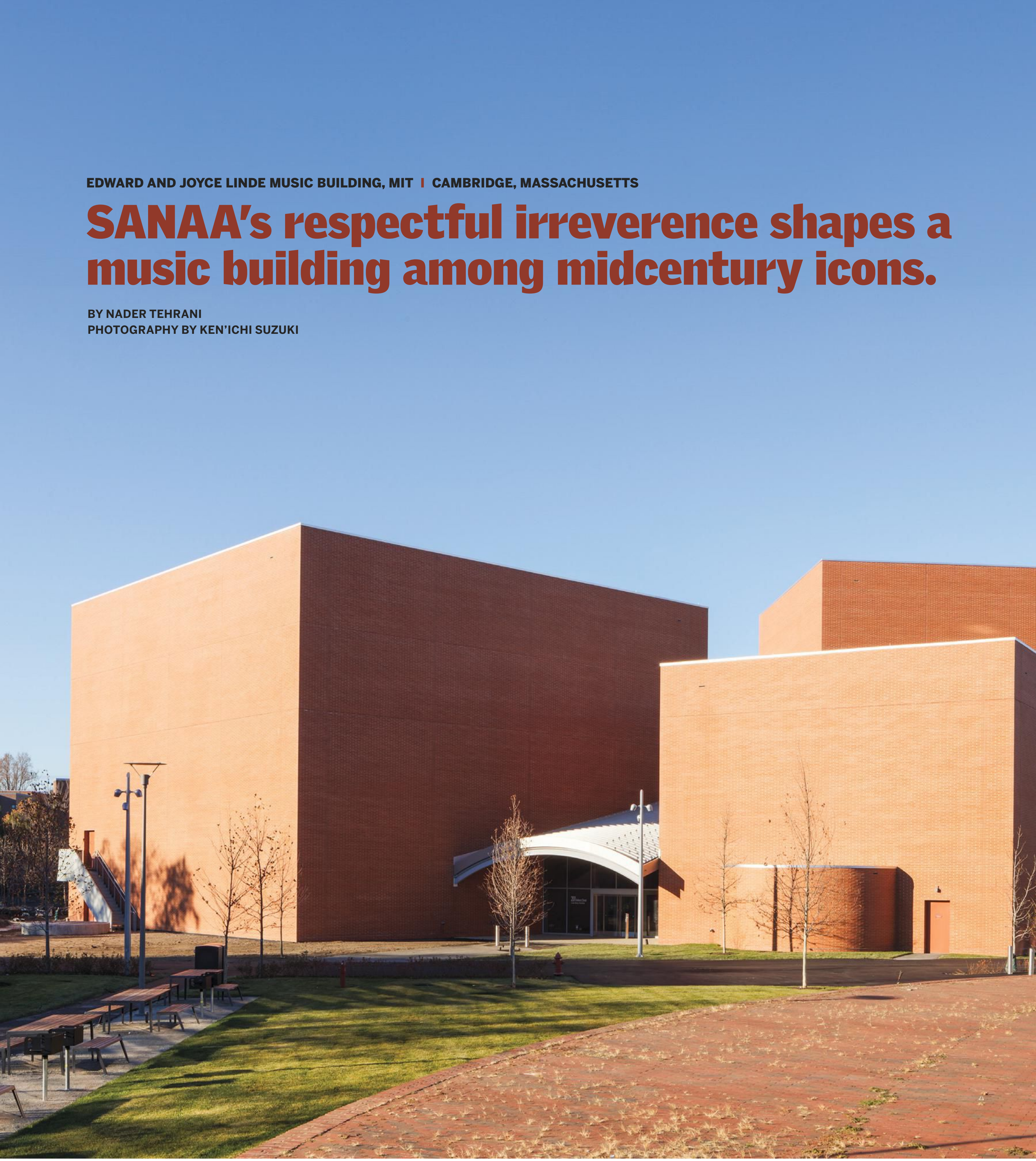
Back up 1,000 feet, behind the Hollywood sign, the Wisdom Tree now seems a parallel gesture to the NBCUniversal redesign, albeit with impoverished means. It too orients a whole system of significance. People stack rocks in memoriam around it, plant flags to remember 9/11, and leave notes of wisdom. The gleaming white and green stretch below is magnificent in its attempt to do this at the scale of urbanism. The question now is whether the machine and its mediation in architecture will continue to supply the meaning we seek to instill. This is a story of permanent mismatch, where the role of architecture is always to render safe the contact between industry and humanity and, in so doing, make a reassuring myth, whether that is the frisson of OMA's proposal or the ordinal sureties of Lever and Field Operations'. Does the security of the pastoral need to originate as a helpmate to corporate power? Or can some other force—perhaps some new formulation of a public—catalyze this work? ■

Andrew Holder and Claus Benjamin Freyinger are coprincipals of The Los Angeles Design Group (The LADG). Holder is visiting associate professor at the University of Pennsylvania Weitzman School, and Freyinger is a lecturer at the UCLA department of Architecture and Urban Design.

EDWARD AND JOYCE LINDE MUSIC BUILDING, MIT | CAMBRIDGE, MASSACHUSETTS

SANAA's respectful irreverence shapes a music building among midcentury icons.

BY NADER TEHRANI
PHOTOGRAPHY BY KEN'ICHI SUZUKI



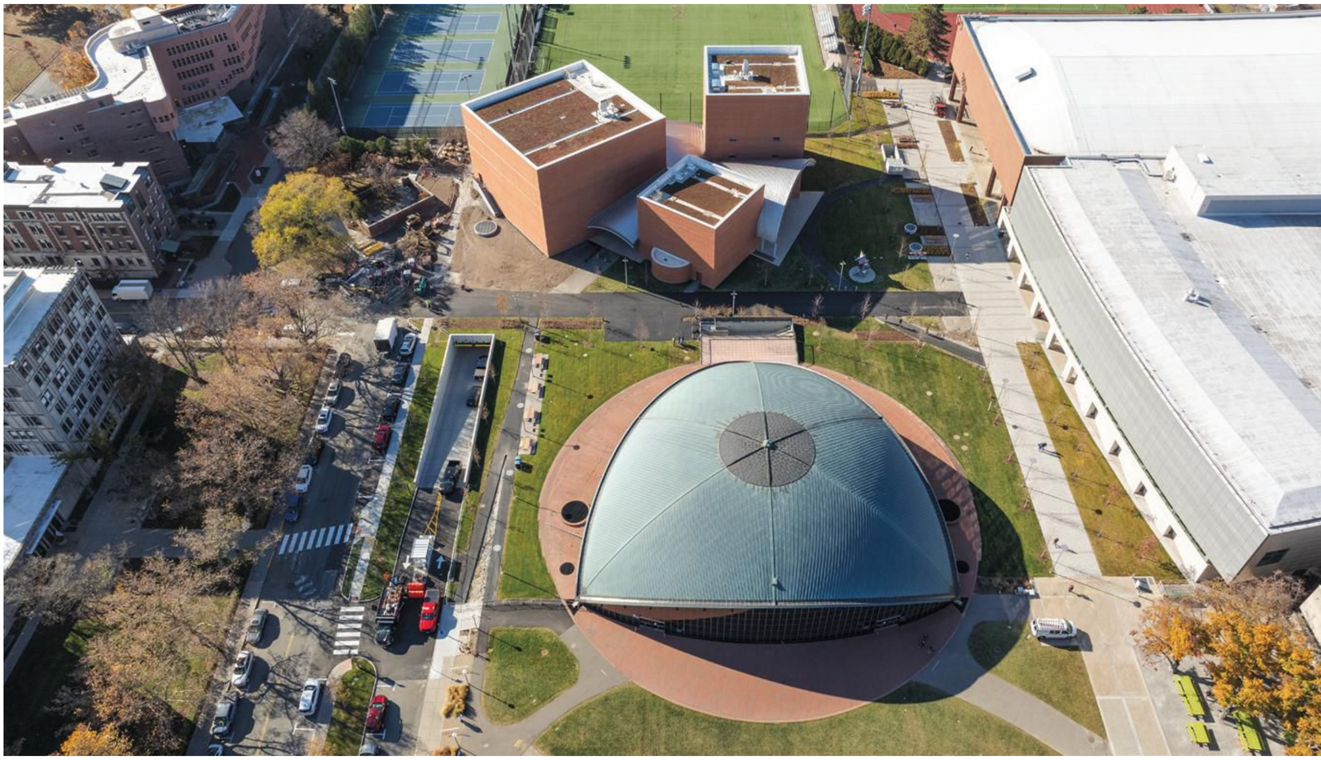
THE VOLUMES of the new music building are set between Aalto's Baker House and Saarinen's Kresge Auditorium.

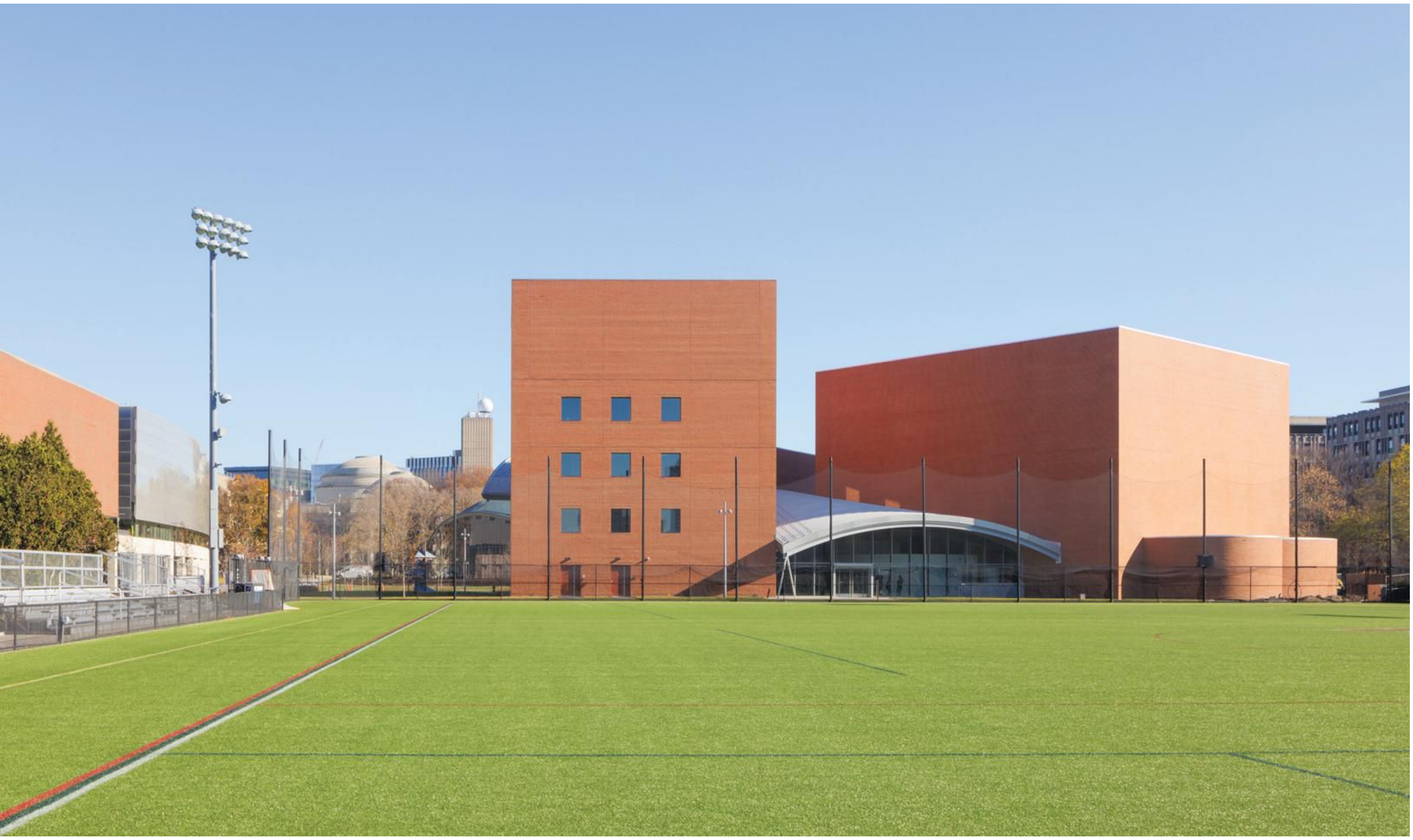
SANAA'S MUCH ANTICIPATED Edward and Joyce Linde Music Building officially opens its doors to the public next month—for Kazuyo Sejima and Ryue Nishizawa, their fourth building in the United States. Situated on the MIT campus, it extends westward the Infinite Corridor—what is colloquially known as the Outfinite Corridor—on axis with MIT's historic entrance on Massachusetts Avenue. Effectively, this area comprises what is possibly the most memorable 20th-century contribution to the campus, with Eero Saarinen's MIT Chapel and Kresge Auditorium (both 1955) framing the Kresge Oval, a public lawn with Eduardo Catalano's Stratton Student Center (1963) to its north, and Alvar Aalto's Baker House (1949) just southwest, making for a formidable Modernist context.

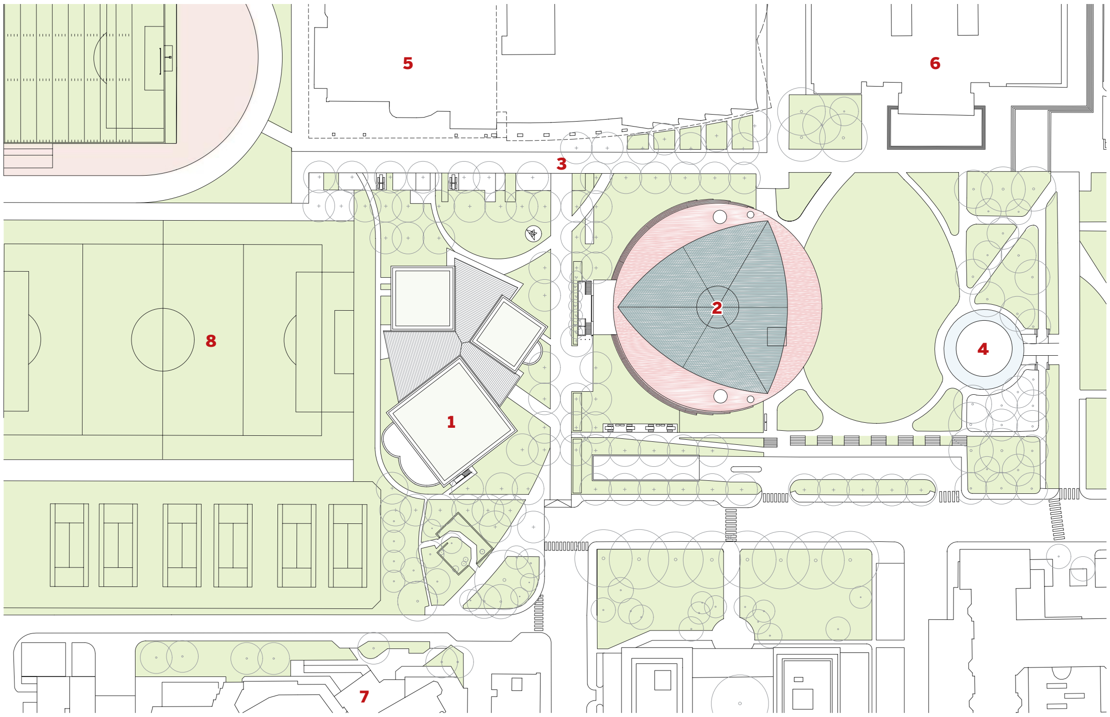
If Saarinen had gotten his way, the chapel and auditorium would have been framed within a master plan of his own making, a larger quad encircled by a thicket of trees on three sides and an institutional building fabric on its western edge, a bookend bringing the academic campus to a terminus facing the sports fields. Of course, history would veer off this path, and, instead, SANAA would inherit the western flank, alongside the athletic complex. Providing an academic home for the music program—the first campus building dedicated solely to music—the siting of SANAA's project is critical. Adjacent to Kresge Auditorium, this allows for the creation of a Performing Arts hub for MIT at large.

SANAA's most memorable contribution to MIT is its response to Saarinen's intended master plan, not so much framing the quad with the backdrop he had envisioned but rather designing an "object building," whose configuration has the capacity to orchestrate a sophisticated urban-design narrative within. The music building absorbs the ambulatory complexity of the campus by acting as the fulcrum through which the students circulate toward their ultimate daily destinations: the dormitories to the southeast and northeast of the sports fields. The circulation of the building is defined by a Y-shaped figure that draws in two diagonal prongs on the east connecting to the campus, and a third prong on the west, framing an expansive view of the sports fields. The porosity of this promenade is all the more important, given the necessary insularity of the building type. The urban strategy is further enhanced by Reed Hilderbrand's landscape, layering trees within a middle ground, helping to mediate between Saarinen's auditorium while punctuating the episodic nature of the promenade.

If SANAA's composition would seem like an urban-design contrivance—embodying the potent scenographic strategies of Galli da Bibiena, but here relieved of the mannerism of his surfaces—then one must also consider the challenge from a programmatic perspective. The division of the building into three volumes within the negative space of the Y stems from a fortunate acoustic mandate requiring sound isolation among the three key functions of the program: Thomas Tull Hall (a concert hall), the Beatrice and Stephen Erdely Music and Culture Space (a rehearsal room primarily for percussion), and the Jae S. and Kyuho Lim Music Maker Pavilion (composed of practice rooms, classrooms, a makerspace, and offices). Polemically breaking with the formality of Saarinen's icons on the east–west axis, the triad of brick volumes functions as a still-life of sorts, with an animate silhouette that mirrors the programmatic blocks and visually dissipates the monumentality of MIT Chapel and Kresge Auditorium with an

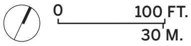


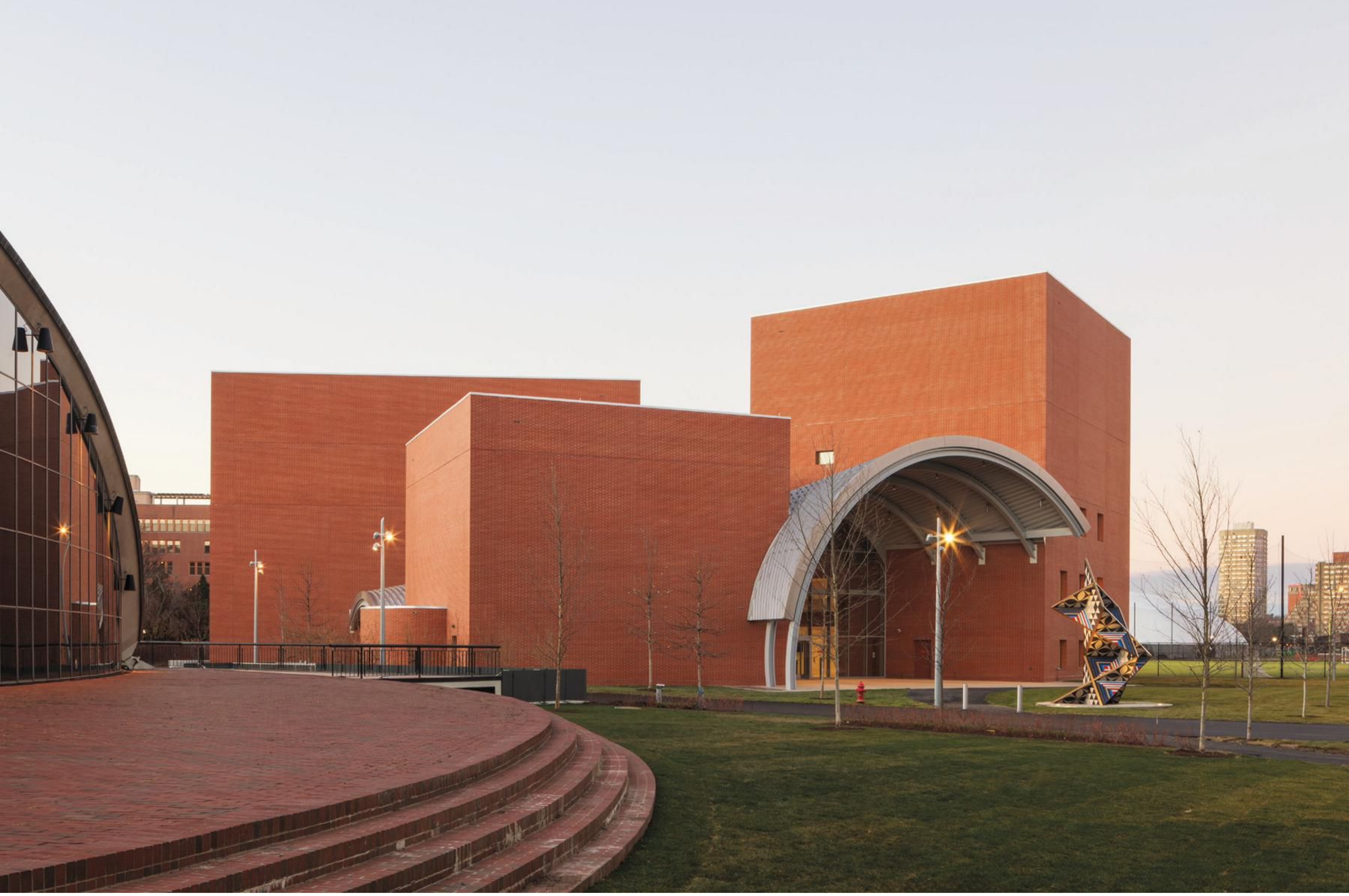




1	EDWARD AND JOYCE LINDE MUSIC BUILDING
2	KRESGE AUDITORIUM
3	OUTFINITE CORRIDOR
4	MIT CHAPEL
5	JOHNSON ATHLETICS CENTER
6	STRATTON STUDENT CENTER
7	BAKER HOUSE
8	ATHLETIC FIELDS

SITE PLAN





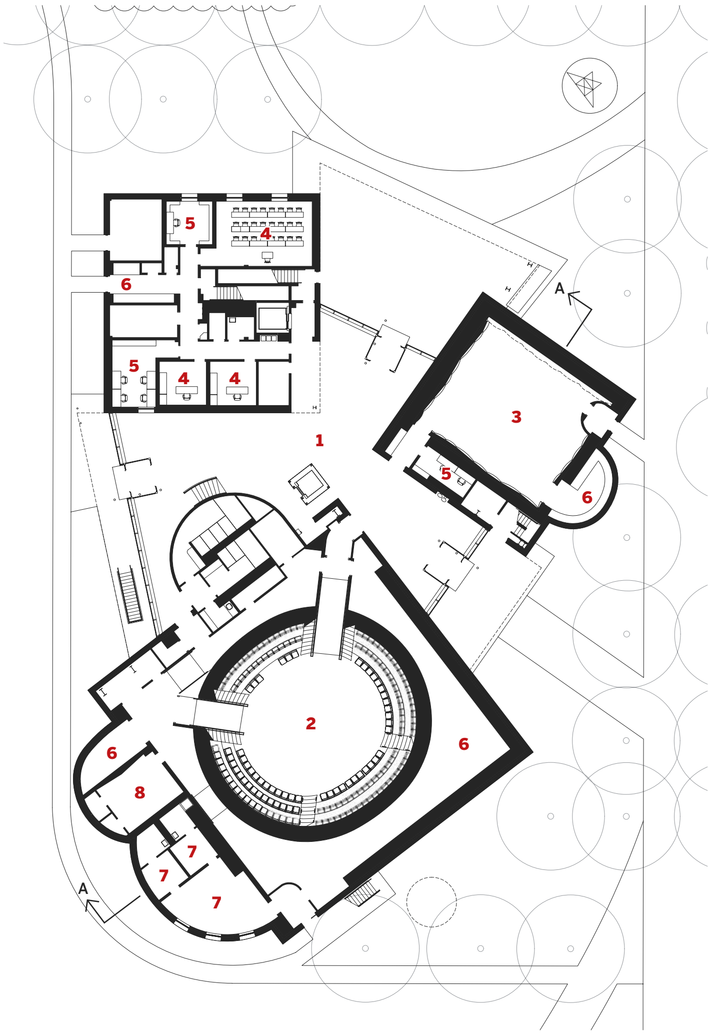
THE ARCHES of Kresge Auditorium, in the background (opposite) and foreground (above), are seen in relation to those of SANAA's building.

architectural "breakwater"—allowing the axis to disperse through the cracks of SANAA's clay monoliths.

Courageous in the risk this strategy entails—effectively extending Saarinen's axis with a third object, albeit aggregated as an assembly of parts—SANAA deftly confronts the dilemma of reverence and irreverence that is the inevitable challenge its contribution poses. Though sculptural in its massing, the adoption of redbrick cladding invariably forces the building to recede as part of its context, inconspicuously forming an extended brick tapestry of 270 degrees, from MIT Chapel, Maseeh Hall (1901), and Baker House all the way around to Davis Brody's Johnson Athletics Center (1981). In other words—despite its formal exuberance, the music building serves as a Band-Aid, bridging the gap on its western flank and creating an extended backdrop for Kresge Auditorium—ensuring that it remains the most dominant figure in the urban space. Stealth in its materiality, yet articulated in its composition, SANAA maneuvers the building towards a seeming contradiction, a deliberate ambivalence it straddles with some confidence.

Each volume is built of steel framing with a double shell of precast concrete to ensure full acoustic autonomy. Thus the seemingly random scattering of brick boxes is anything but, and is somehow a semantic embodiment of the inevitable acoustic separation required between the main programmatic elements, in direct orchestration with a strategic urban narrative. As great architects might, their thoughtful collaboration was reinforced, on the one hand, by the acoustic precision of Nagata Acoustics and, on the other, by the leadership of Keeril Makan, an extraordinary composer and associate dean of the school of humanities, who acted as a sounding board for MIT's varied musical talents. Together, they set their eyes on Frank Gehry's Pierre Boulez Hall in Berlin (RECORD, March 2017), which would serve as a model for the type of flexibility their proposed concert hall would engender. If the mission of the music building was to provide a dignified home for its students and faculty, then how it negotiates its visual and acoustic performance would be balanced out by this expanded team. Beyond the purity of the mute clay blocks, interventions punctuating the massing register a language that betrays hints of recognizable elements: of apses and bays for practice/green rooms, of fluting and striations for surfaces, all formal deformations indicating an escape from the rectitude of the platonic volumes. These formal and geometric tropes address acoustic mitigation, attending to such phenomena as reverberation and resonance, all while embracing the manner in which the forms mediate between the inside and outside, the surfaces and the massing.

All said, the allusive nature of these figures maintains a distance from both typological and iconographic quotations. By their own admission, the architects' embrace of the radial forms in plan and section was a way to create a dialogue with Saarinen's chapel and auditorium, two buildings whose languages are distinct in their own right—different scales, materials, geometries, and levels of detail. They nonetheless revolve around a shared formal foundation to which the music building adds a new chapter. With the introduction of the monumental arches (the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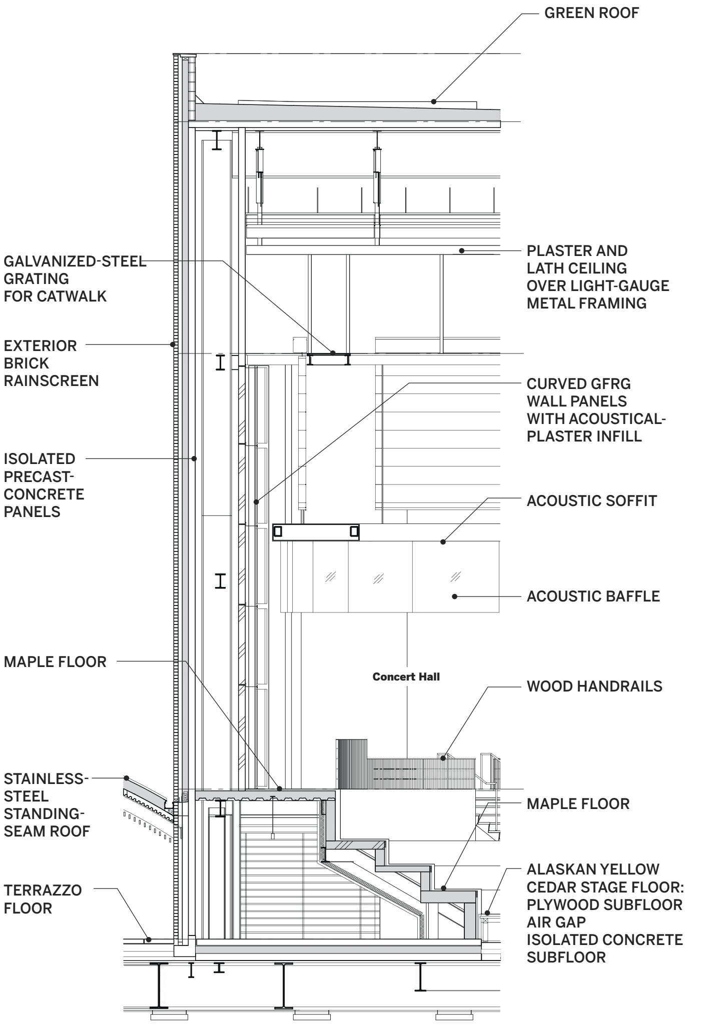
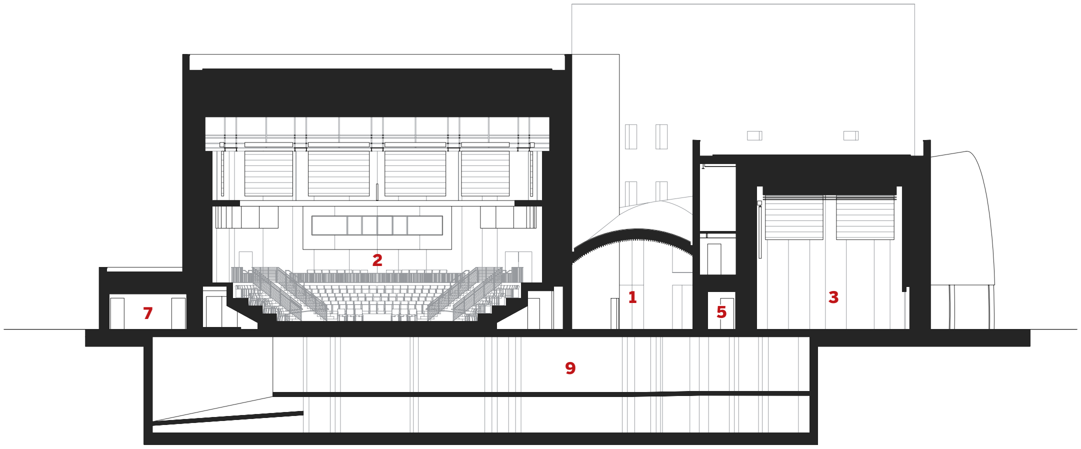
GROUND-FLOOR PLAN

0
30 FT.
10 M.


GREEN ROOF
GALVANIZED-STEEL GRATING FOR CATWALK
PLASTER AND LATH CEILING OVER LIGHT-GAUGE METAL FRAMING
EXTERIOR BRICK RAINSCREEN
CURVED GFRG WALL PANELS WITH ACOUSTICAL-PLASTER INFILL
ISOLATED PRECAST-CONCRETE PANELS
ACOUSTIC SOFFIT
ACOUSTIC BAFFLE
MAPLE FLOOR
Concert Hall
WOOD HANDRAILS
STAINLESS-STEEL STANDING-SEAM ROOF
MAPLE FLOOR
ALASKAN YELLOW CEDAR STAGE FLOOR: PLYWOOD SUBFLOOR AIR GAP ISOLATED CONCRETE SUBFLOOR
TERRAZZO FLOOR

WALL SECTION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- **1** LOBBY
- **2** CONCERT HALL
- **3** REHEARSAL ROOM
- **4** CLASSROOM
- **5** OFFICE
- **6** INSTRUMENT STORAGE
- **7** MUSICIANS' LOUNGE
- **8** RECORDING
- **9** PARKING

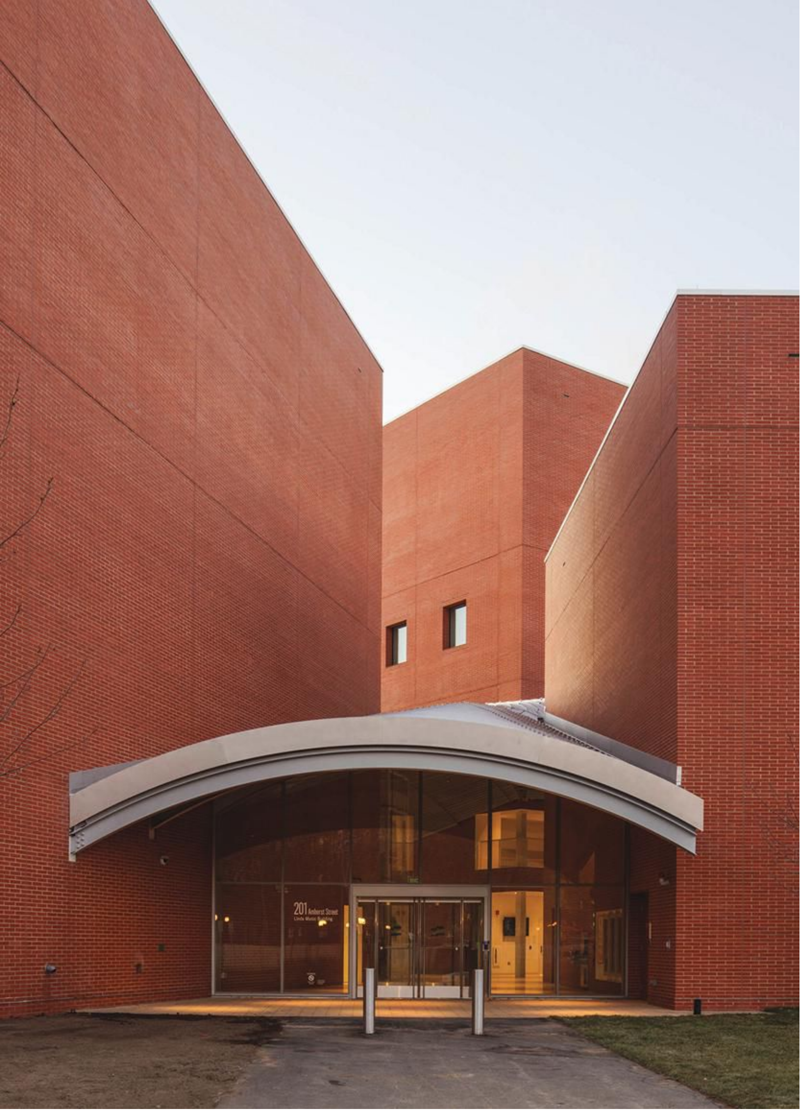
SECTION A - A

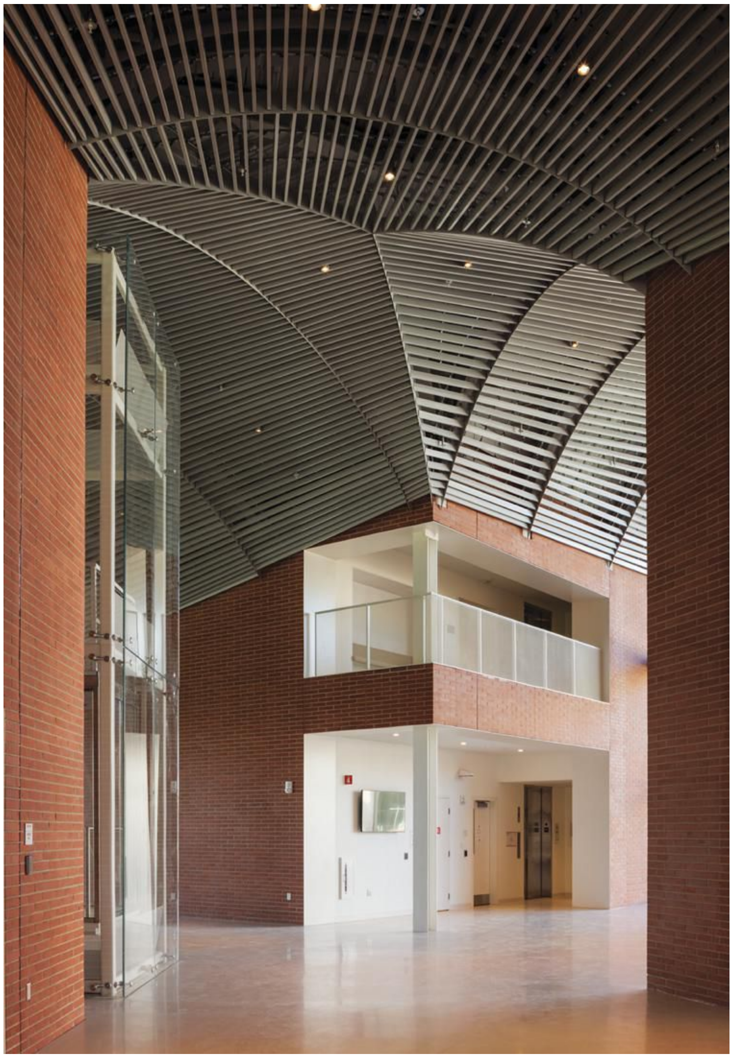
0
15 FT.
5 M.

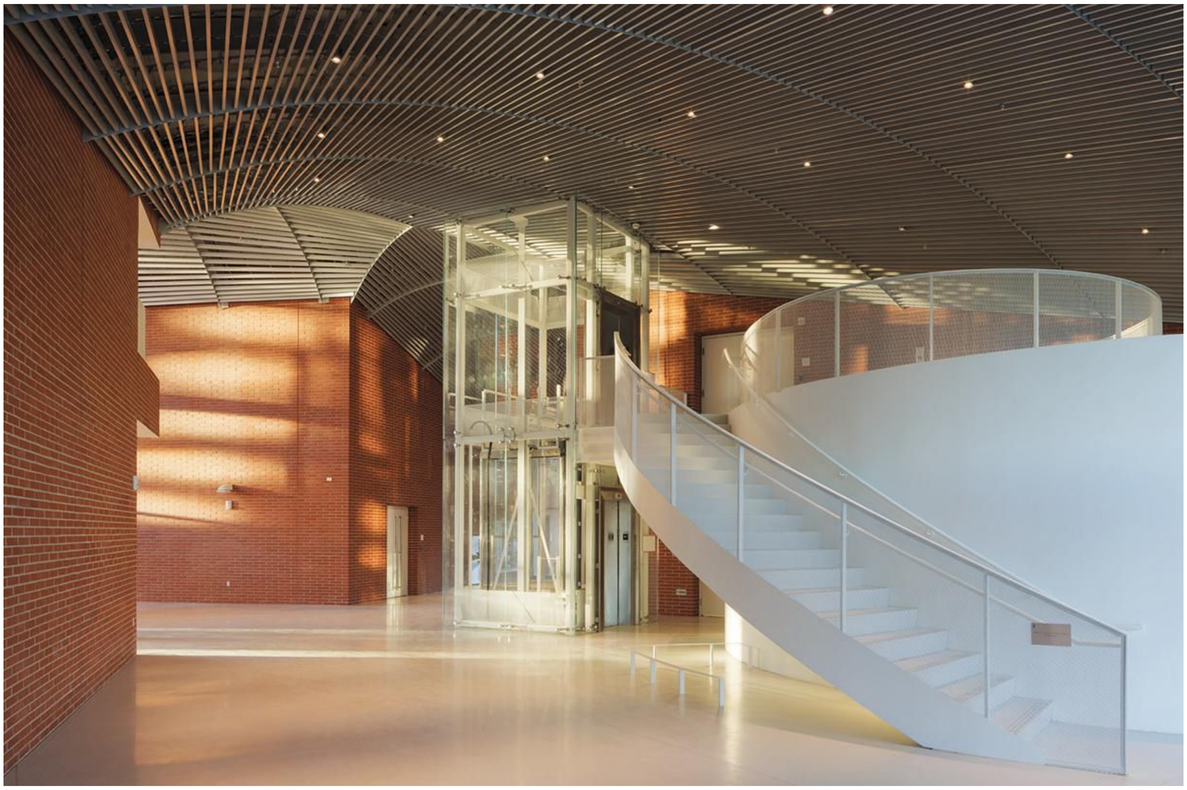
THE CONCERT HALL seats close to 400 around a central performance space (above). A rehearsal room hosts musicians on percussion instruments (right).

manifestation of the Y in spatial terms), SANAA takes a turn in its trajectory that is possibly less predictable. The firm's history of formal explorations commonly maintains a fidelity to abstraction, allusive connections to the landscape, and self-similarity, swerving away from referential overtness. From the main perspective of the Outfinite Corridor looking east, then, one cannot suppress the iconographic bias linking SANAA's new entry arch to the Kresge vault and the lower arches of the MIT Chapel, all collapsed into one view; here we witness a linguistic dimension in this work, something that is less common in the firm's oeuvre. SANAA's own three arches vary in size, scale, and hierarchy, all beautifully converging as a vortex at the center of the lobby; but its main arch, facing the Outfinite Corridor, is also meant to serve as an outdoor rehearsal room, with the conical geometry of the arch containing the sound, all while communicating an ambiguously "gramophonic" figure with semantic range. In the richness of this view, Saarinen, the gramophone, and the acoustic performance of arches meet in what is akin to "a chance encounter of a sewing machine and umbrella on an operating table."

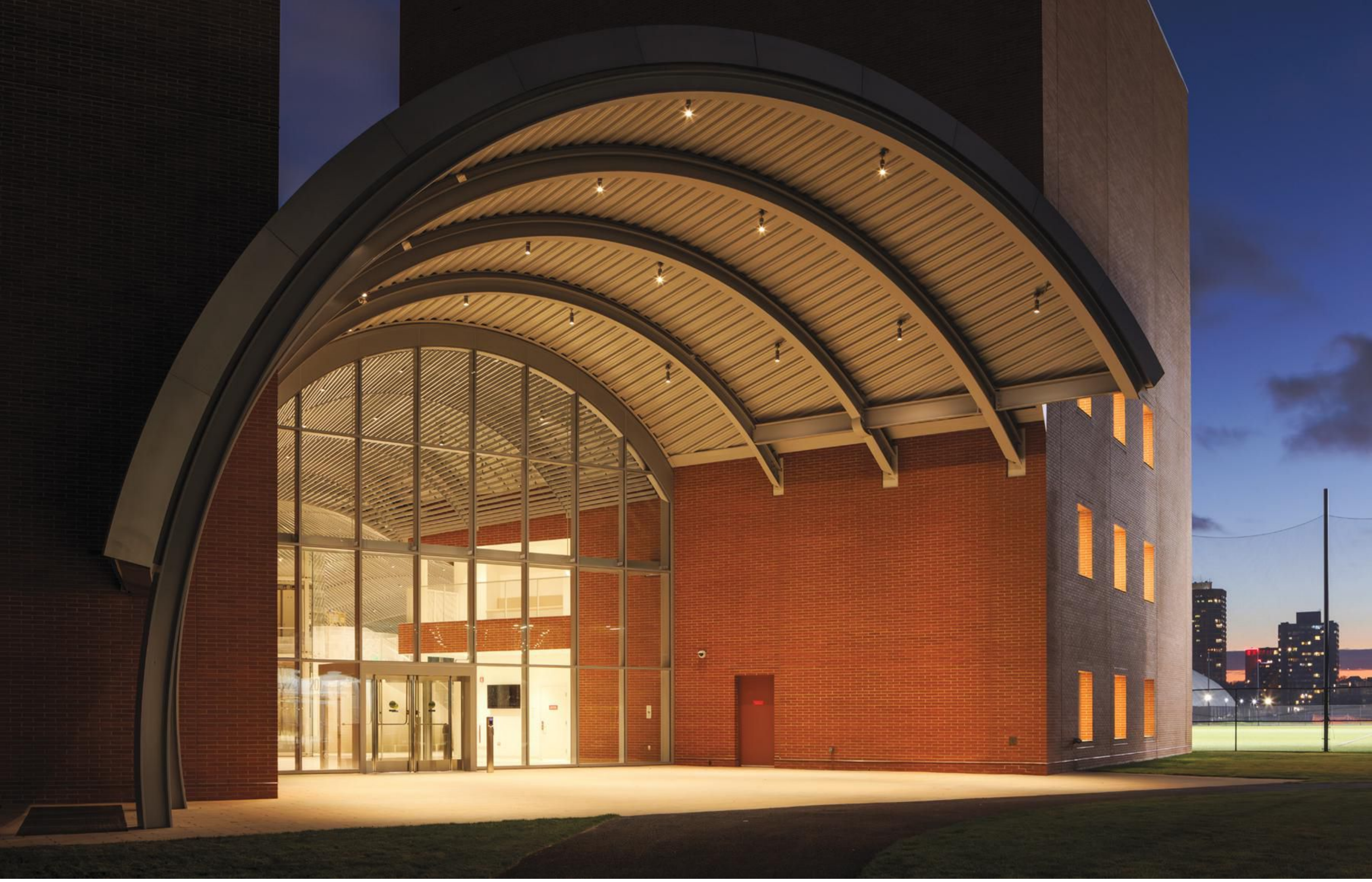
Despite this, the exposure of the curved extruded I-beams, the revelation of the standing-seam metal roofing atop, and the rawness of the building's expression are so deadpan in their representation that they defy the kind of transcendence one







THE EXTERIOR arches (above, left and opposite), converge in the interior lobby space (above and left) between the three brick volumes.



might expect of SANAA. Known for an architecture of luminous immateriality, of visual ambiguity, and of experiential phenomena, this building remains stoic in its allegiance to material conventionalism, a realism that seeks beauty in the everyday. In the past, the architects have worked painstakingly to hide the evidence of the building's infrastructure behind the scenes, making things look simple even when the labor of concealment is a monumental architectural task; here, things remain exposed in their exacting organization. Sejima and Nishizawa, in speaking with me, referred to the difficulty of finding the right brick unit for this special occasion, a brick with the versatility of turning corners, navigating radii, and other feats intended to secure its mass. For a curtain wall, they undertook all efforts to maintain the integrity of the brick volumes as monolithic blocks, even if the inevitable requirement of expansion joints compromises the continuity of the running bond assemblage. Still, it is in the specification of things so prosaic that we discover a stubborn adherence to SANAA's sense of the generic, that also comes through in the matter-of-fact institutional characteristics, elegant and precise as they are, but also explicit in their insistence that the building is "just a building."

Though this might seem a deviation in SANAA's path, I think it's a self-conscious one, where the architects focus not only on visual phenomena as played out through their formal, spatial, and material strategies, but expand their lens to a broader sensorial field. As such, the building's visual dexterity is not only legible at the urban scale but transformative for the campus at large—and the closer one gets to its surfaces, its interiors, and its details, the more the visual recedes intentionally, displaced by a necessary deference to the auditory. The building's performance aptly transcends normative experiences within an amplified sonic medium—embracing their rightful audiences, the building chambers eventually find their voice as a series of mellifluous acoustic instruments. ■

Nader Tehrani is the founding principal of NADAAA, former dean of the Irwin S. Chanin School of Architecture of the Cooper Union, and former head of the department of architecture at MIT. He and his team have authored two projects on the MIT campus, MIT Site 4 and MIT Kendall Gateway.

Credits

ARCHITECT: SANAA — Kazuyo Sejima, Ryue Nishizawa, principals; Yumiko Yamada, Amy Hyemin Jang, Hiroaki Katagiri, Takayuki Furuya, Naoya Harada, Iven Peh, Pat Pongteekayu

EXECUTIVE ARCHITECT: Perry Dean Rogers Partners Architects

ENGINEERS: Silman (structural); Buro Happold (m/e/p/fp); Nitsch Engineering (civil); Haley & Aldrich (geotechnical)

CONSULTANTS: Reed Hilderbrand (landscape); Nagata Acoustics (acoustics); SAPS / Sasaki and Partners (structural concept); TheatreDNA (theater); Buro Happold (lighting); Front (facade); Transsolar KlimaEngineering (energy)

GENERAL CONTRACTOR: Lee Kennedy

CLIENT: Massachusetts Institute of Technology

SIZE: 98,650 square feet

COST: withheld

COMPLETION DATE: December 2024

Sources

MASONRY: Cerámicas Mora

CURTAIN WALL: Kawneer

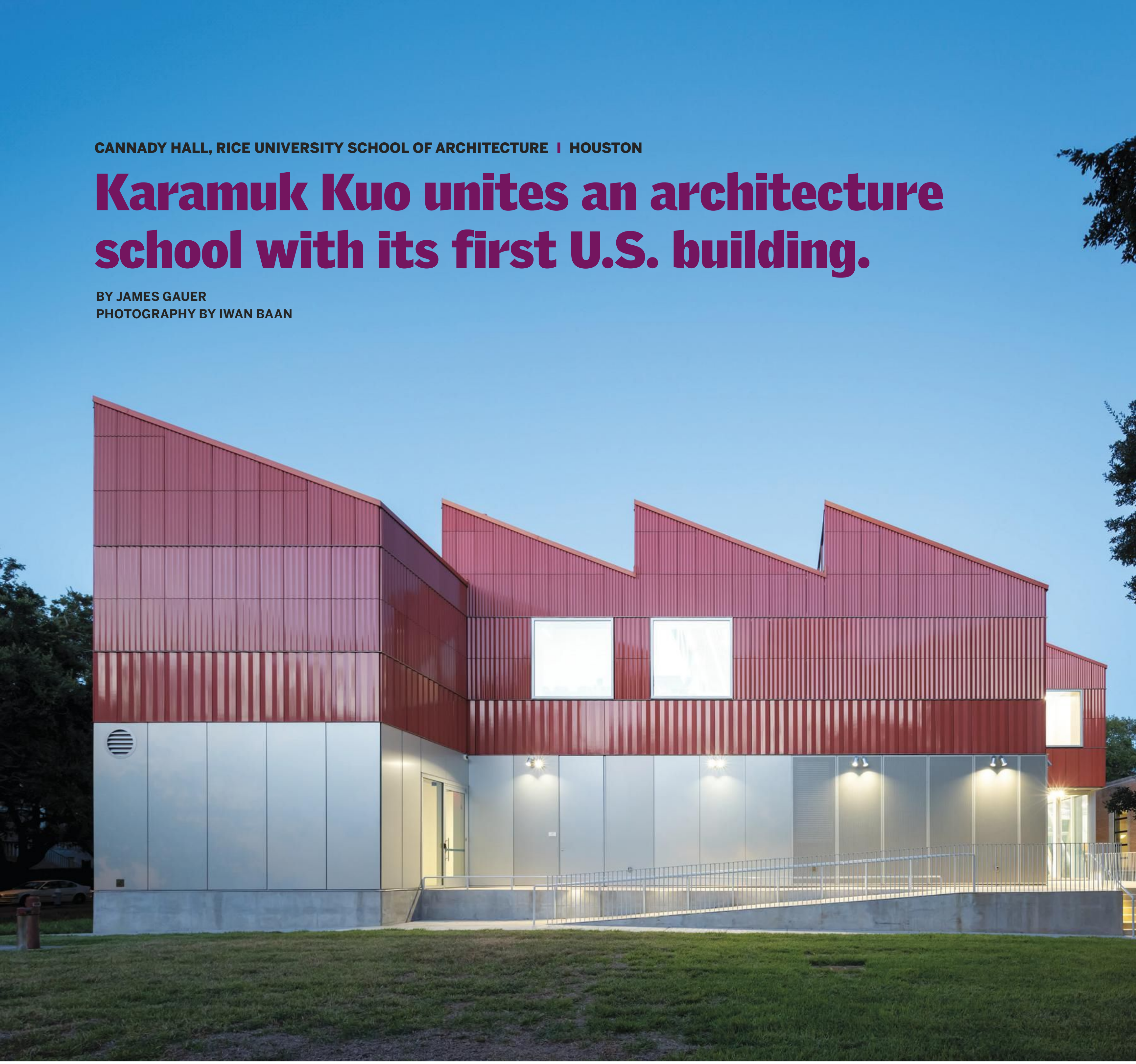
STANDING SEAM ROOF: Bemo

METAL WINDOWS: Schüco

CONCERT HALL SEATING: Poltrona Frau

LIGHTING: Lucifer

LOBBY BAFFLES: Gordon



CANNADY HALL, RICE UNIVERSITY SCHOOL OF ARCHITECTURE | HOUSTON

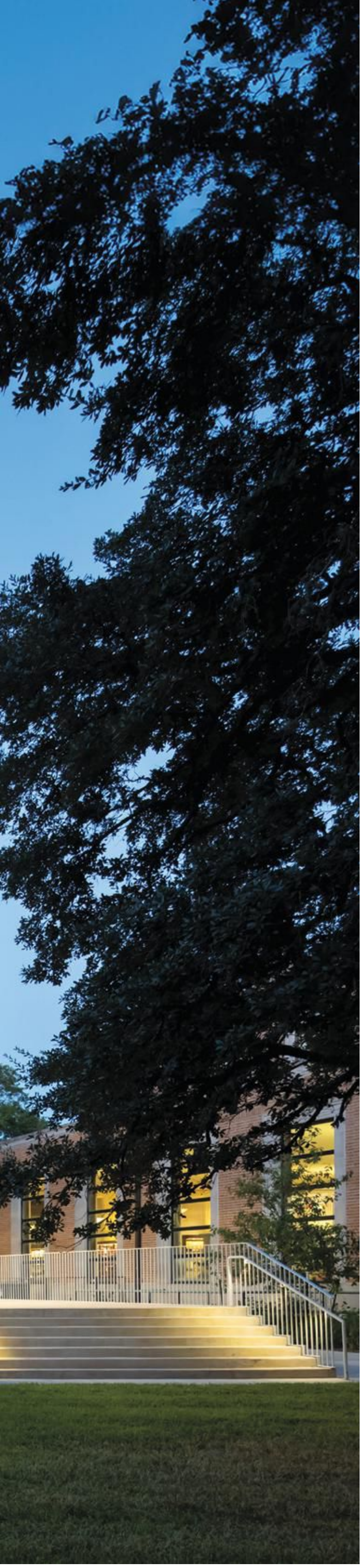
Karamuk Kuo unites an architecture school with its first U.S. building.

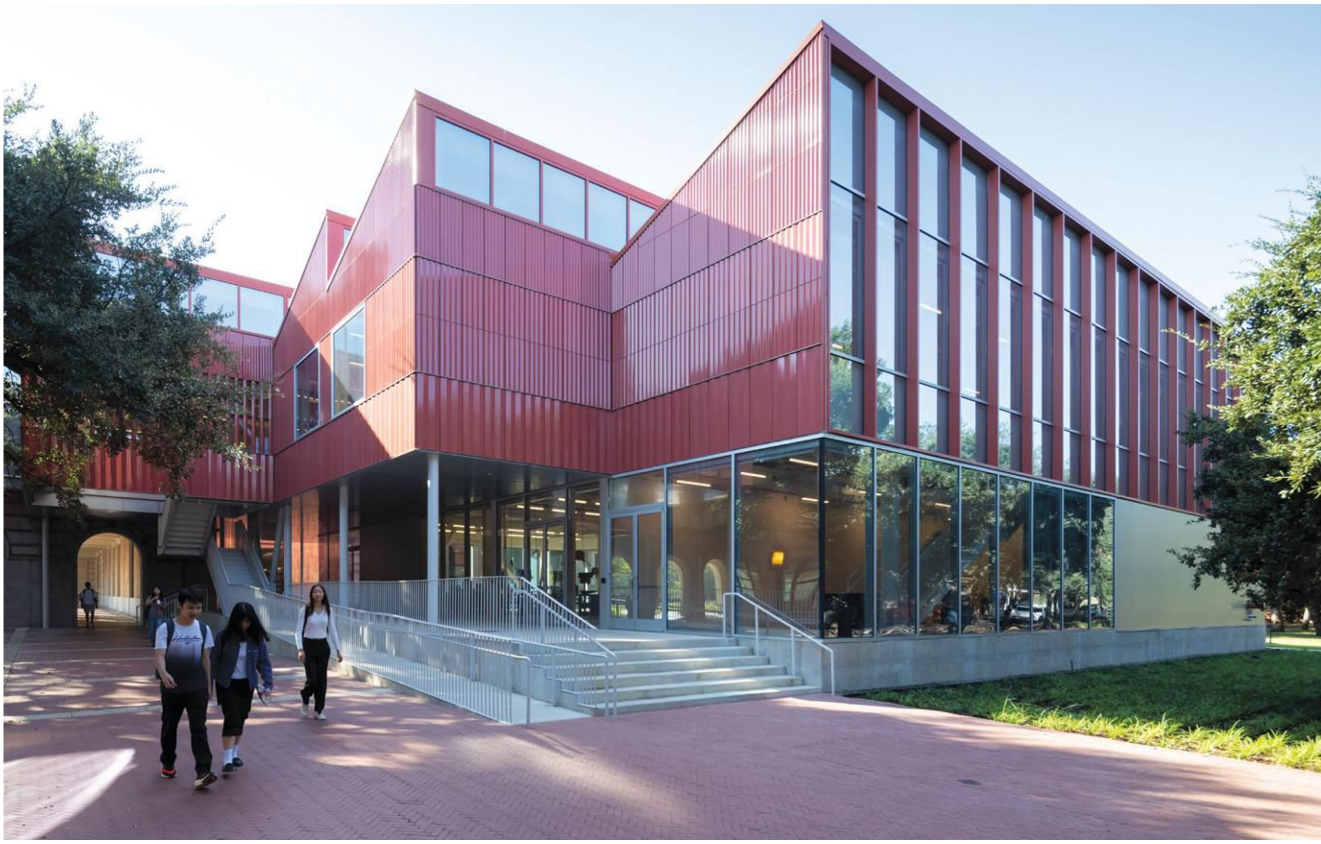
BY JAMES GAUER
PHOTOGRAPHY BY IWAN BAAN

THE VENERABLE and verdant campus of Rice University in Houston began in 1910 with a Beaux-Arts master plan by Cram, Goodhue and Ferguson of Boston. Over the next two decades, architect Ralph Adams Cram began to fill this axial arrangement of lawns, courtyards, and quadrangles with a series of handsome brick-and-stone buildings, distinguished by arcades and spires, in a fanciful variation on the Byzantine Revival style.

In 1947, Anderson Hall, designed by Staub and Rather of Houston, provided a new home for the School of Architecture in a prominent location on the main academic quad. John Staub had been Cram's student at the Massachusetts Institute of Technology, and, even though Modernism was on the rise, he chose to emulate his teacher's eclectic historicism, albeit with more abstract and planar detailing. In 1981, British architects James Stirling and Michael Wilford completed an addition so modest and unassuming in its adherence to this idiom that Philip Johnson, peering from the window of his limousine in mock bewilderment, quipped "I came to see Jim [Stirling]'s building but couldn't find it."

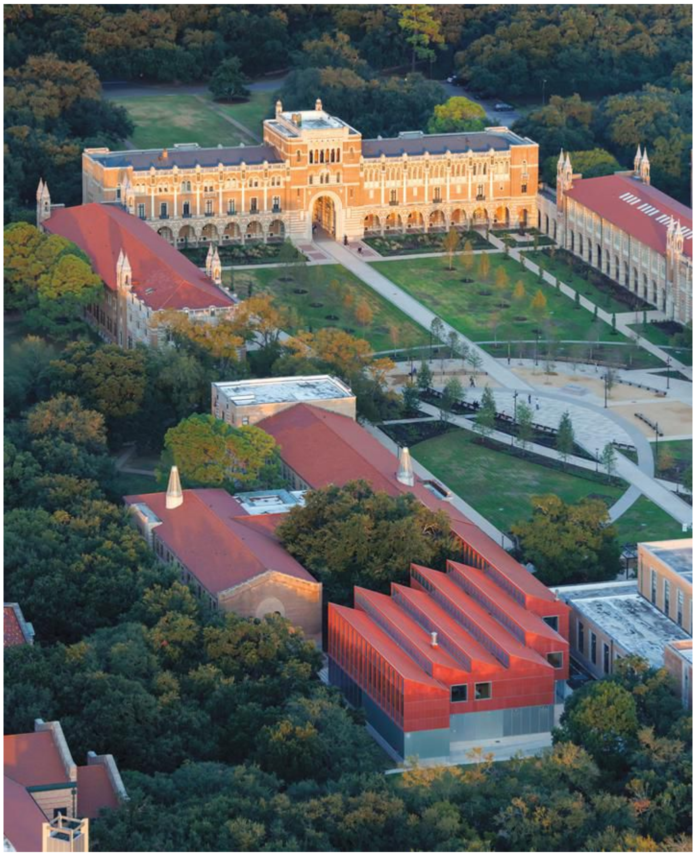
The newest addition is Cannady Hall, named after professor emeritus William T. Cannady and inaugurated last month. Zurich-based Karamuk Kuo took an alto-



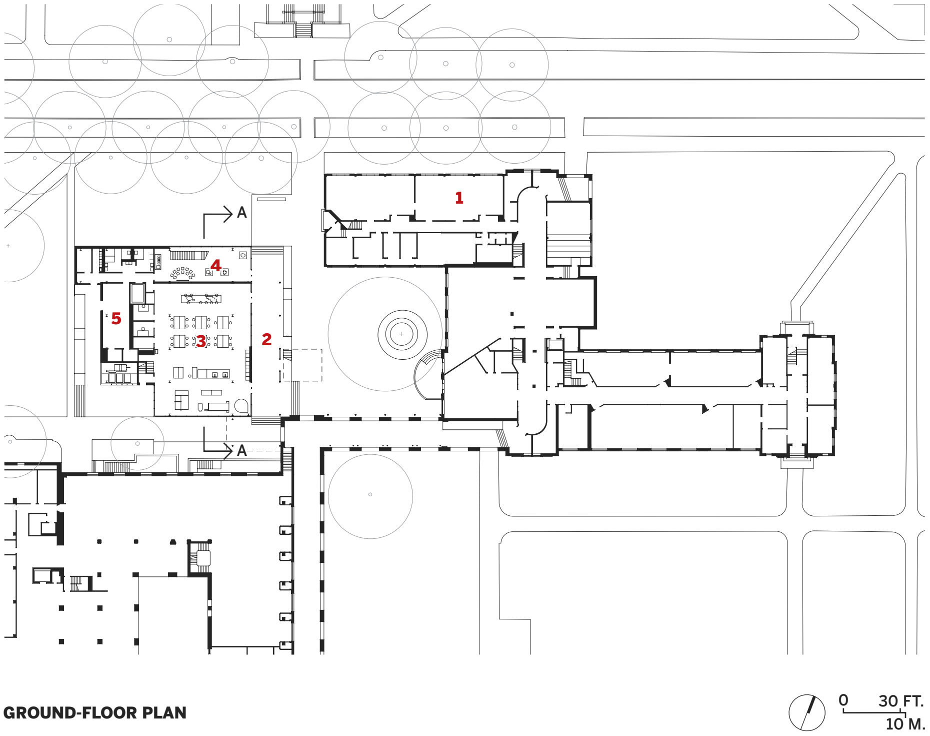


gether different approach with this expansion. “Rice was keen on having a forward-looking image that would also be timeless,” says Jeannette Kuo, who designed the building with her husband and partner, Ünal Karamuk. “They wanted a project that would distinguish the school, giving it new visibility while respecting its legacy. We all felt that to respect the context was not to mimic it but to be in dialogue with it, to acknowledge the value of both its time and our own.”

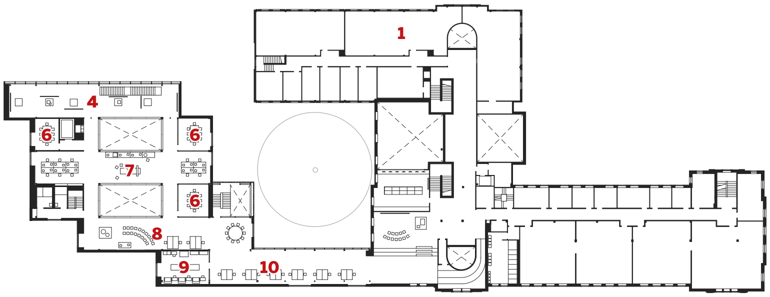
A courtyard dominated by a century-old oak tree precluded a direct ground-level connection to Anderson Hall (recently renovated by Chicago-based Kwong Von Glinow). Karamuk Kuo responded to this constraint with an ingenious parti. They created a long, linear connector by adding a second floor above and beyond an existing one-story arcade of stone and brick, which sits to the west of Anderson Hall at the courtyard’s southern edge. Enclosed at the front by an extension of Anderson’s brick wall and sloped clay-tile roof, this appendage continues the material language of the quad. But it’s more than just a contextual circulation device; it’s also a planning module, a long, narrow bar approximately 18 feet wide, which is repeated in five additional parallel



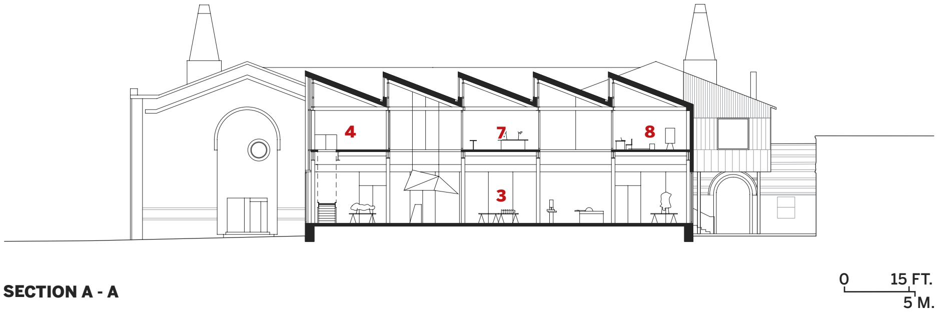
THE BUILDING stands apart, with its sawtooth roof (above) and expansive glazing (top, right), while remaining in conversation with its neighbors (right).



GROUND-FLOOR PLAN



SECOND-FLOOR PLAN



SECTION A - A

1 MD ANDERSON HALL (EXISTING)
2 PORCH
3 WORKSHOP/FABRICATION
4 GALLERY
5 MECHANICAL
6 MEETING ROOMS
7 COLLABORATIVE WORKSPACE
8 STUDENT ATELIER
9 LASER-CUTTING ROOM
10 INFORMAL WORK GALLERY

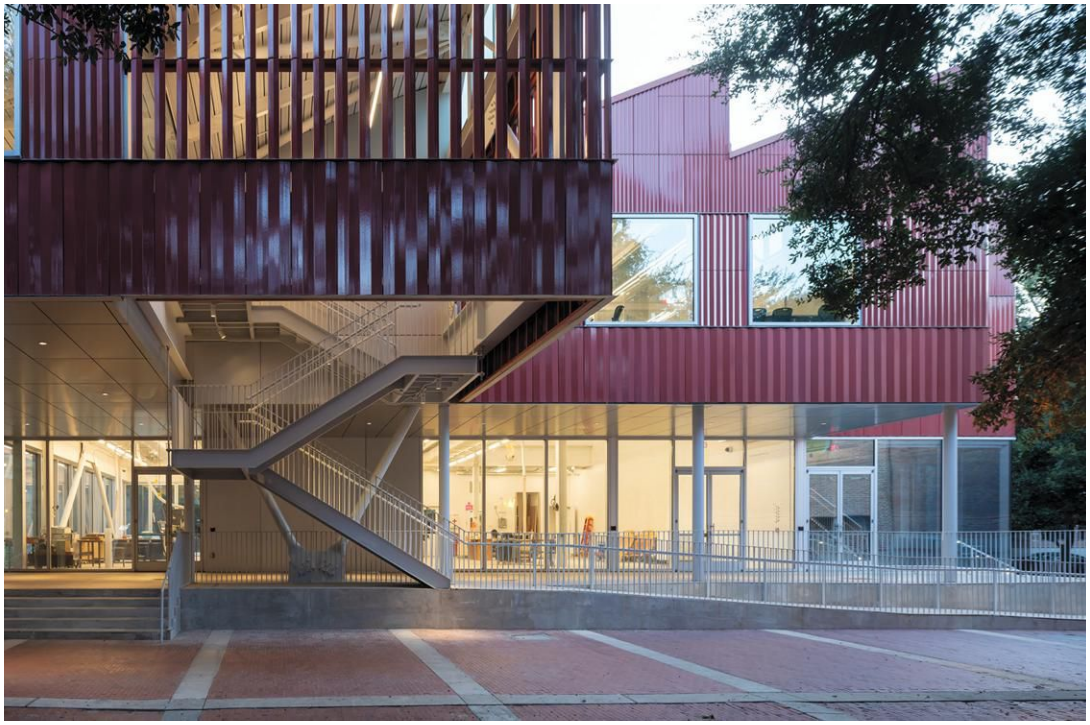
bars of varied lengths to the north. These shift progressively to the west and combine to form a new 22,000-square-foot volume, topped by a sawtooth roof that in section articulates the modules and provides north-facing clerestories.

The parallel bars establish a rigorous structural grid that facilitates a rational organization of program elements, with clear circulation between them. On the first floor, a large fabrication hall opens to an outdoor work terrace to the west and a porch overlooking the courtyard to the east. On the second floor, surrounded by tree canopies, are spaces for research, meetings, and casual pin-ups, along with galleries for more formal exhibits, all softly daylit by the clerestories. Two double-height volumes allow for construction of tall models while connecting the levels visually. The artfully layered spaces are luminous, functional, and easily navigated.

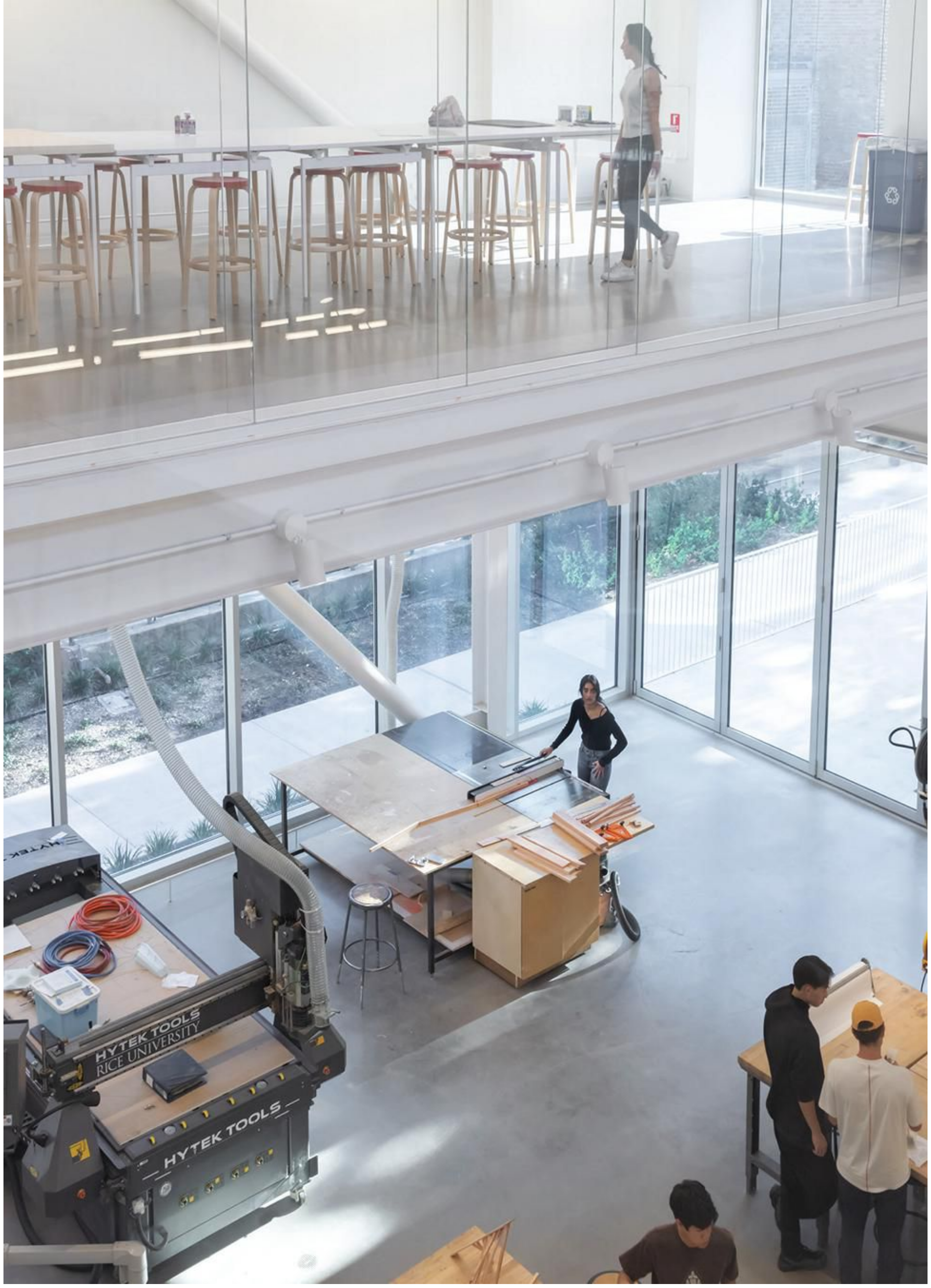
The new construction is framed in steel that is bolted rather than welded together, to allow for the possibility of disassembly in the future to accommodate changes. On the inside, this frame is exposed. Except at service areas tucked into the northwest corner, most partitions are glass, which provides an astonishing degree of transparency. Floors are polished concrete, ducts and pipes are exposed, and just about everything is painted white. "The interior has an industrial character that promotes physical experimentation, stripping away any preciousness in the architecture," says Kuo. "The building celebrates the users, and its visual transparency builds community. The learning environment becomes one of not only formal instruction but also informal exchanges where students can be inspired by the work of their peers."

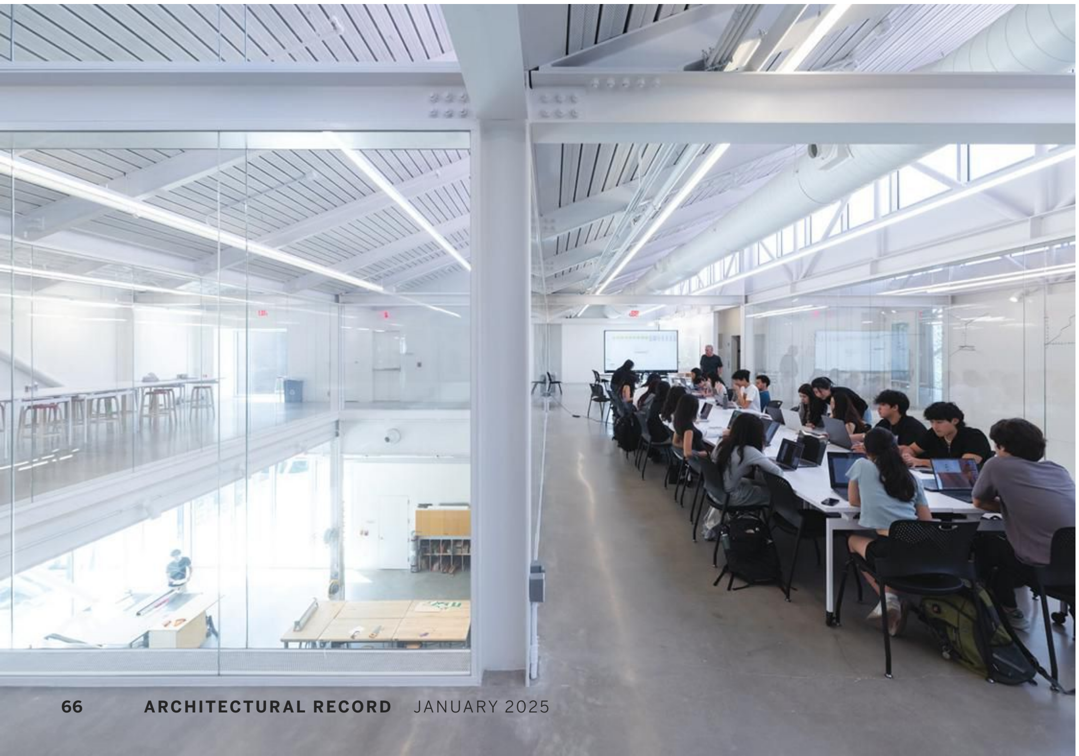
On the exterior, much of the lower level is glazed, while the upper level is mostly clad with a rainscreen system of glazed terra-cotta panels in three different profiles, held in place by concealed clips. "It's a sustainable, biodegradable material that needs no maintenance," Kuo explains. "With its color and changing cadences, it references the surrounding brick buildings and their decorative friezes while presenting a new image." Unlike Cram's, Staub's, and Stirling's monumental masonry masses, which hug the ground, Karamuk Kuo's clay-toned geometric modules seem to hover in midair.

"The transparency of the building makes design visible in a way that it was not before," says Igor Marjanović, dean of the School of Architecture. But, given that there's no shortage of local architects well suited to that



A PORCH and exterior stair (left) face into an oak tree–shaded courtyard where an arcade (above) has been topped with a connector between buildings.





THE LIGHT-FILLED interior includes a double-height fabrication workshop (left) with collaborative-study areas above (below, left).

task, why did Rice choose a firm based in Switzerland? “We’re an international school with global reach,” explains Marjanović, whose own path to Texas began in Serbia. To say that Karamuk Kuo’s principals are cosmopolitan or peripatetic would be an understatement. Jeannette was born in Indonesia and met Ünal—a student of Turkish heritage from the ETH Zürich—at Harvard. After working separately for several high-profile firms in New York, they decided their chances of success with a firm of their own were better in Switzerland, where an open system of public competitions gives young practices access to significant projects. This is their first major commission in the U.S.

Rice faculty were deeply engaged in the design process. “We protected the parti,” says Marjanović. How did Kuo feel about having architects as clients? “It was great,” she replies with a laugh. “I didn’t have to explain everything.” ■

Contributing editor James Gauer is an architect and author based in Chicago and San Miguel de Allende, Mexico. He ran his New York–based design practice for 20 years, completing projects on both coasts and in Canada. He holds a master’s degree in architecture from Columbia University.

Credits

ARCHITECT: Karamuk Kuo

ARCHITECT OF RECORD: Kendall/Heaton Associates

ENGINEERS: Ensight Haynes Whaley (structural); Collaborative Engineering (m/e/p); Walter P. Moore (civil)

CONSULTANTS: Tillotson Design Associates (lighting); NV5 (sustainability); Lauren Griffith Associates (landscape); Shen Milsom Wilke (acoustics); Morrison Hershfield (envelope)

GENERAL CONTRACTOR: Linbeck Group

CLIENT: Rice University School of Architecture

SIZE: 22,000 square feet

COMPLETION DATE: June 2024

Sources

CLADDING: Alpolic (metal panels); Boston Valley Terra Cotta (rainscreen)

ROOFING: Berridge Manufacturing Company (metal); Ludowici (tile)

ACOUSTICAL CEILINGS: Armstrong

PAINT: Sherwin-Williams

LIGHTING: Creative Systems Lighting, Lucifer (downlights); Alphabet (exterior)

ELEVATORS: Canton Elevator

BUILDING AUTOMATION: Distech Controls

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PREFABRICATION

This special section explores the latest in prefabrication. It highlights technological advances in residential modular construction, both flat-pack and volumetric. It examines structural innovations, like a low-embodied-carbon concrete floor system, feats of infrastructural engineering, easy-to-build pop-up retail and public amenities, and novel accessory dwelling units.

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76 **Vaulted Floor Systems**

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88 **Danube Valley Bridge**
Linz, Austria | Schlaich Bergermann Partner

92 **Bal Harbour Shops Pop-Up**
West Palm Beach, FL | LOT-EK

COLLEGE ROAD, LONDON,
BY HTA DESIGN.

PHOTOGRAPHY: © EMPHASIS PHOTOGRAPHY

CONTINUING EDUCATION

To earn one AIA learning unit (LU), including one hour of health, safety, and welfare (HSW) credit, read the Prefabrication section on pages 70–95, then complete the quiz. Upon passing the quiz, you will receive a certificate of completion, and your credit will be automatically reported to the AIA. Additional information regarding credit-reporting and continuing-education requirements can be found at continuingeducation.bnpmedia.com.

Learning Objectives

1. Discuss the potential advantages of prefabrication in reducing construction schedules and material waste.
2. Explain how fabrication within a factory setting can improve construction quality and environmental performance.
3. Understand best-in-practice project-delivery methods for large prefabricated infrastructural projects.
4. Outline structural-design considerations particular to prefabricated buildings.

AIA/CES Course #K2501A

STACK ’EM UP!

A new generation of projects could reshape the residential-construction market.

BY MATTHEW MARANI

THE CONSTRUCTION industry is known for its slim profit margins and erratic market cycles—this despite accounting for $13 trillion in spending worldwide in 2023, or approximately 7 percent of global gross domestic product. Many of the sector’s inefficiencies stem from low gains in productivity, which, according to a report released by McKinsey & Company in August 2024, lags that of other industries. The construction sector saw just a 10 percent improvement in productivity between 2000 and 2022, compared to a 50 percent gain across the entire economy and 90 percent within the manufacturing sector.

Modular construction has long promised to address industry roadblocks such as a decline in skilled workers and the lack of standardization from one project to the next. Successive high-profile construction startups, like Katerra, which filed for bankruptcy in 2021, have seemingly been unable to crack the code of long-term viability. But the fact remains, modular construction—with components manufactured within controlled settings and shipped as either flat-pack assemblies (think IKEA, but with building systems and components), or volumetric forms (fully integrated stacked boxes)—can offer a suite of advantages when compared to traditional modes of

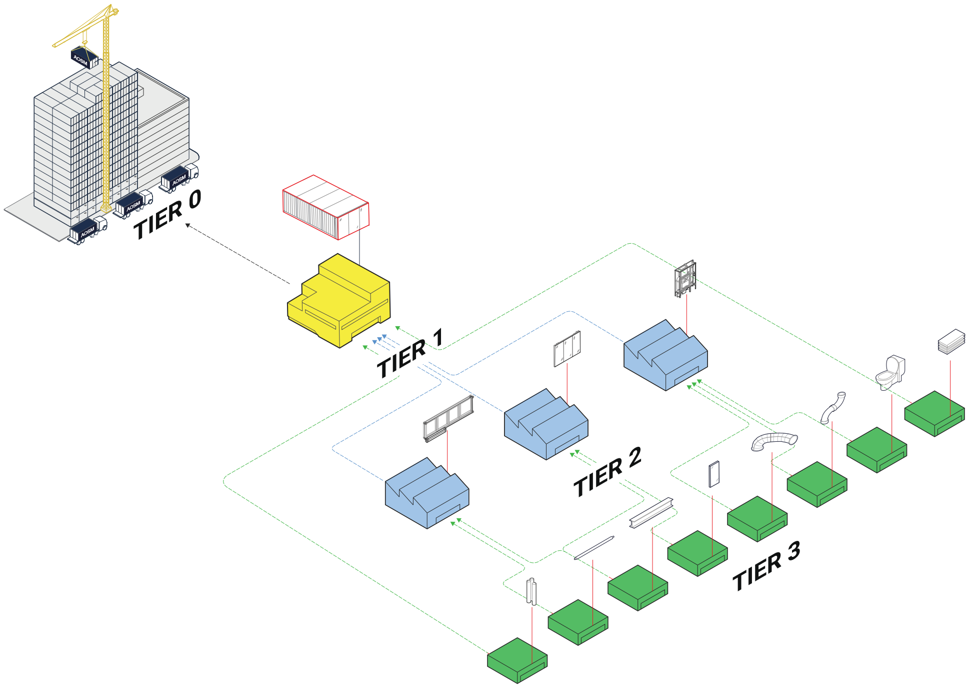
PHOTOGRAPHY: © SIMON TOPLIS; SHOOOTIN/ASSEMBLY OSM (OPPOSITE)

COLLEGE ROAD’s modules are stacked to achieve a chevron-like massing (opposite). Assembly OSM’s St. Felix project uses a brick rainscreen to blend into its context (right).

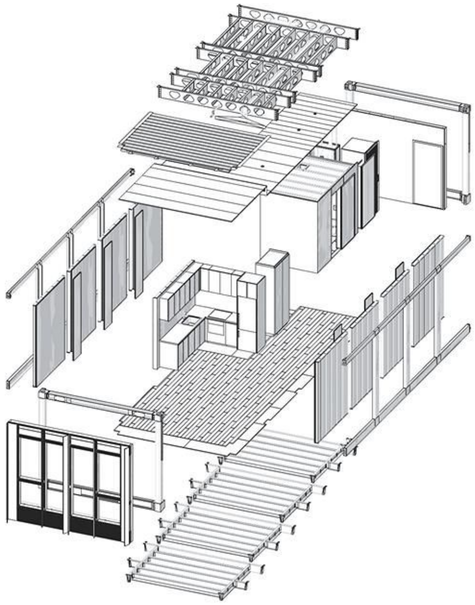
building, especially in residential construction.

The workhorse of the American housing market is the often-maligned five-over-one, the multifamily residential buildings typically composed of several light-frame wood stories on a concrete podium. Despite their ubiquity, they are, according to Gensler principal Brooks Howell, inherently inefficient. “A typical multifamily project might end up with 35 different unit types, which requires varying wall, kitchen, and bathroom layouts, and a number of custom items,” says Howell. “In the United States, partially owing to market demand for lower housing density and the size of the timber industry, we haven’t really moved past balloon framing.”

Instead, Howell and his team, in collaboration with developer Resia, a subsidiary of Brazilian construction giant MRV, rolled out a different approach at Ten Oaks Resia in Houston, which opened for leasing in March 2024. It consists of three 12-story towers with nearly 600 one-, two-, and three-bedroom apartments. They dub their methodology “module construction,” focusing on the repetition of systems, components, and units. At Ten Oaks, and across Resia’s portfolio, a



SUPPLY-CHAIN DIAGRAM



AXONOMETRIC DRAWING OF ASSEMBLY OSM MODULE

TEN OAKS harnesses the mass repetition of systems for cost savings (above, left and above). Vessel Technologies completed a mid-rise, flat-pack modular residential building with 30 units in well under two years (left).

standard set of reusable concrete formworks are deployed for the buildings' cast-in-place structural systems, which allows for rapid installation, predetermined routes for mechanicals and plumbing, and uniform window openings. Critically, each unit features an 8-foot by 8-foot cantilevered balcony, which is just the right size for craning in Resia's in-house-manufactured bathroom, mechanical and laundry, kitchen, and storage-module pods. Such standardization pays dividends, albeit without placing aesthetic considerations front and center.

"A project of such scale in central Texas could take over 36 months to complete; we wrapped up construction in 22 months," Howell points out. "Reducing the time for project delivery and the material efficiencies of the system put the cost of each tower in the range of a standard four-over-one stick-frame structure." In effect, their approach is yielding over double the square footage, with higher-quality construction, at comparable cost.

For modular-construction companies Assembly OSM (founded by SHoP Architects principals William and Chris Sharples) and Vessel Technologies, both based in New York, many of the pitfalls thwarting advances in the modular industry result from a failure to emulate the production methodologies of other industries such as automobile or smartphone manufacturing.

"Replicating construction indoors is not enough to actually drive the type of efficiencies and productivity gains to mitigate the up-front cost of opening a factory and the associated logistics of project delivery," explains Andrew Staniforth, CEO of Assembly OSM. Its approach is akin to designing and building a car. They harness CATIA, a design software first developed for the aerospace industry, to create proprietary designs with tight tolerances, which are then bid out to a network of subcontractors; those pieces then come together as volumetric modular elements within Assembly OSM's manufacturing facility in Harrison, New Jersey.

On the ground, in the Clinton Hill neighborhood of Brooklyn, the firm is nearing completion of its first project, 147 St. Felix, which serves as something of a prototype for projects to come. The three-story building's modules were installed in just 24 hours, with its brick cladding added on-site. While small, with just a pair of two-bedroom apartments, the structural-steel chassis of the modules was designed by engineer Arup to be scaled to up to 30 stories. The modules are also fully electrified and designed with Passive House features like 8-inch-thick continuous insulation and heat pumps. Going forward, the firm has received approvals for a 15-story project in Manhattan; in the Boston area, two towers, to reach 16 and 19 stories, respectively, are currently in schematic-design and feasibility phases.

Vessel Technologies, in collaboration with

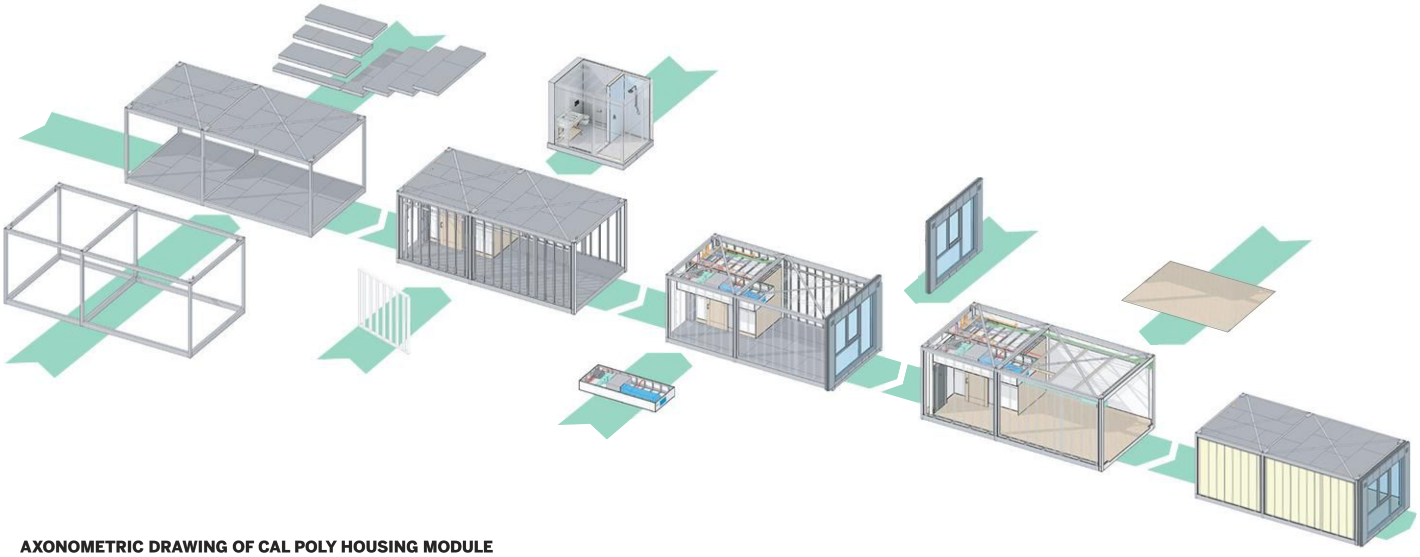
IMAGES: © GENSLER (TOP, LEFT); HUGH HARGRAVE PHOTOGRAPHER (TOP, RIGHT); VESSEL TECHNOLOGIES (BOTTOM); STEINBERG HART (OPPOSITE, LEFT AND RIGHT); FULLSTACK MODULAR (BOTTOM)

CALIFORNIA POLYTECHNIC State University is adding thousands of student beds to its San Luis Obispo campus, with the hope that modular design and construction will drive down costs and campus-wide disruption (above, left and above).

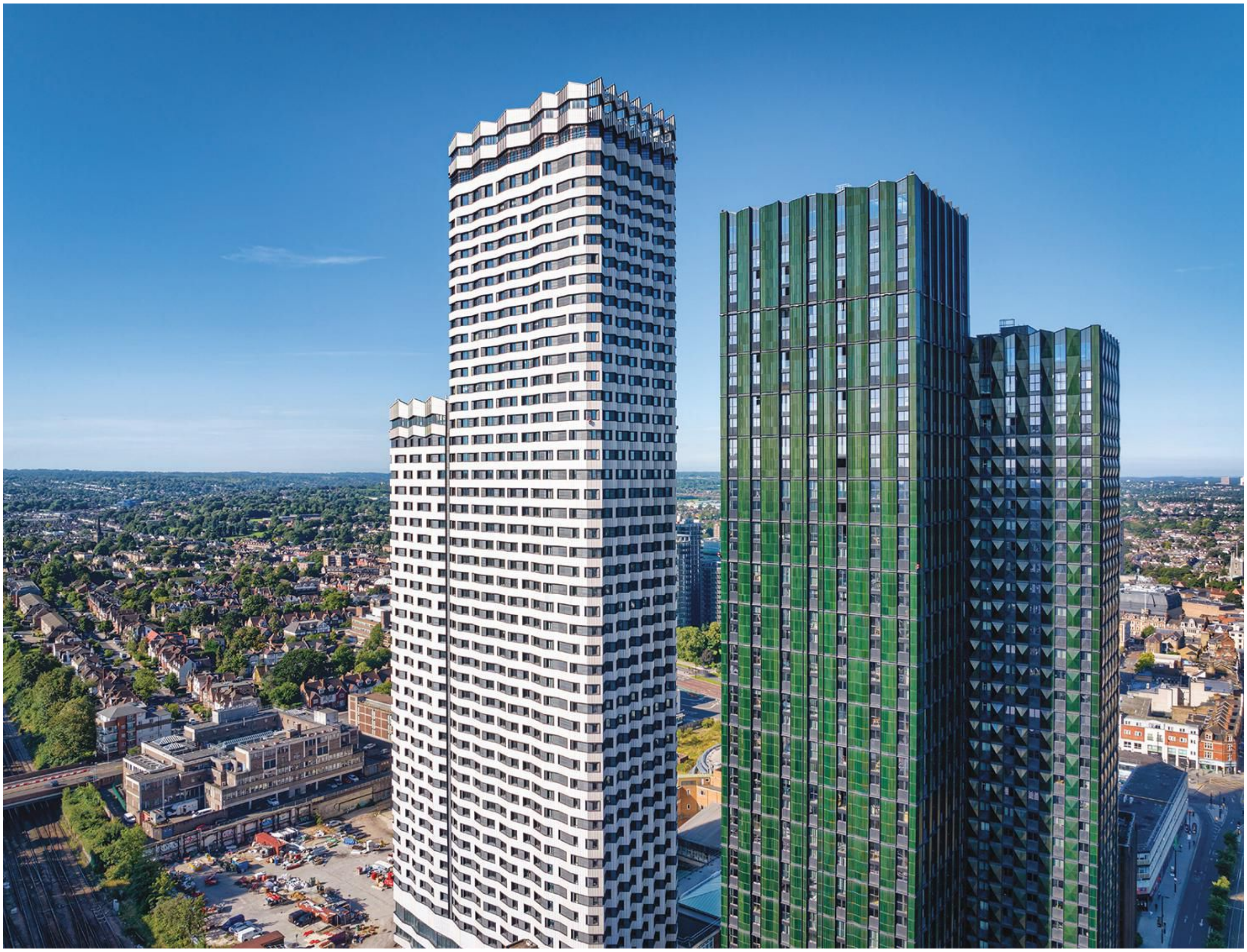
New York– and Los Angeles–based engineering firm Büro Ehring, has developed a flat-pack modular system that is being used across 13 mid-rise housing projects in various stages of permitting or construction, mainly in New Jersey and Connecticut. “We believe that many in the prefabrication or modular-building business became confused as to who the customer really is. It is in fact the resident and, as an intermediary, the developer, not the architect,” notes Vessel Technologies founder and CEO Neil Rubler.

Similar to the way electronics manufacturers offer successive generations of smartphones, Vessel’s approach emphasizes a specific product offering with regular updates, taking advantage of advances in building performance. Their first completed project, dubbed V1, is a five-story, 30-unit property in New London, Connecticut, which broke ground in spring 2023 and opened for leasing in fall 2024. “The system here is performance-driven, and our foremost question going forward is how to simplify installation and improve upon what are essentially flat-pack panels,” details Büro Ehring principal Holger Schulze-Ehring. “Then we figure out what that means for the facade and other finishes.”

What will modular construction look like as it becomes more ambitious in scale? In San Luis Obispo, California Polytechnic State University is undertaking an expansive plan to add 5,500 beds to the campus by 2035 through new construction and the renovation of six existing residence halls. “The university realized that the most cost-effective means to address housing demand on campus was to bid for one large project rather than 400 or 800 units at a time,” explains David Hart, CEO and president of Steinberg Hart, the



AXONOMETRIC DRAWING OF CAL POLY HOUSING MODULE



COLLEGE ROAD and Ten Degrees, in London's Croydon, are two of the tallest modular buildings in the world (above and opposite). The interior finishes are conventionally installed (left).

PHOTOGRAPHY: © APEX DRONE PHOTOGRAPHY (TOP); TARAN WILKHU (BOTTOM); BILLY BOLTON (OPPOSITE)

architecture firm collaborating with Arup, FullStack Modular, and Whiting-Turner on the student housing. "Our design-build project, using volumetric modular methods, will reduce delivery times and disruption on campus."

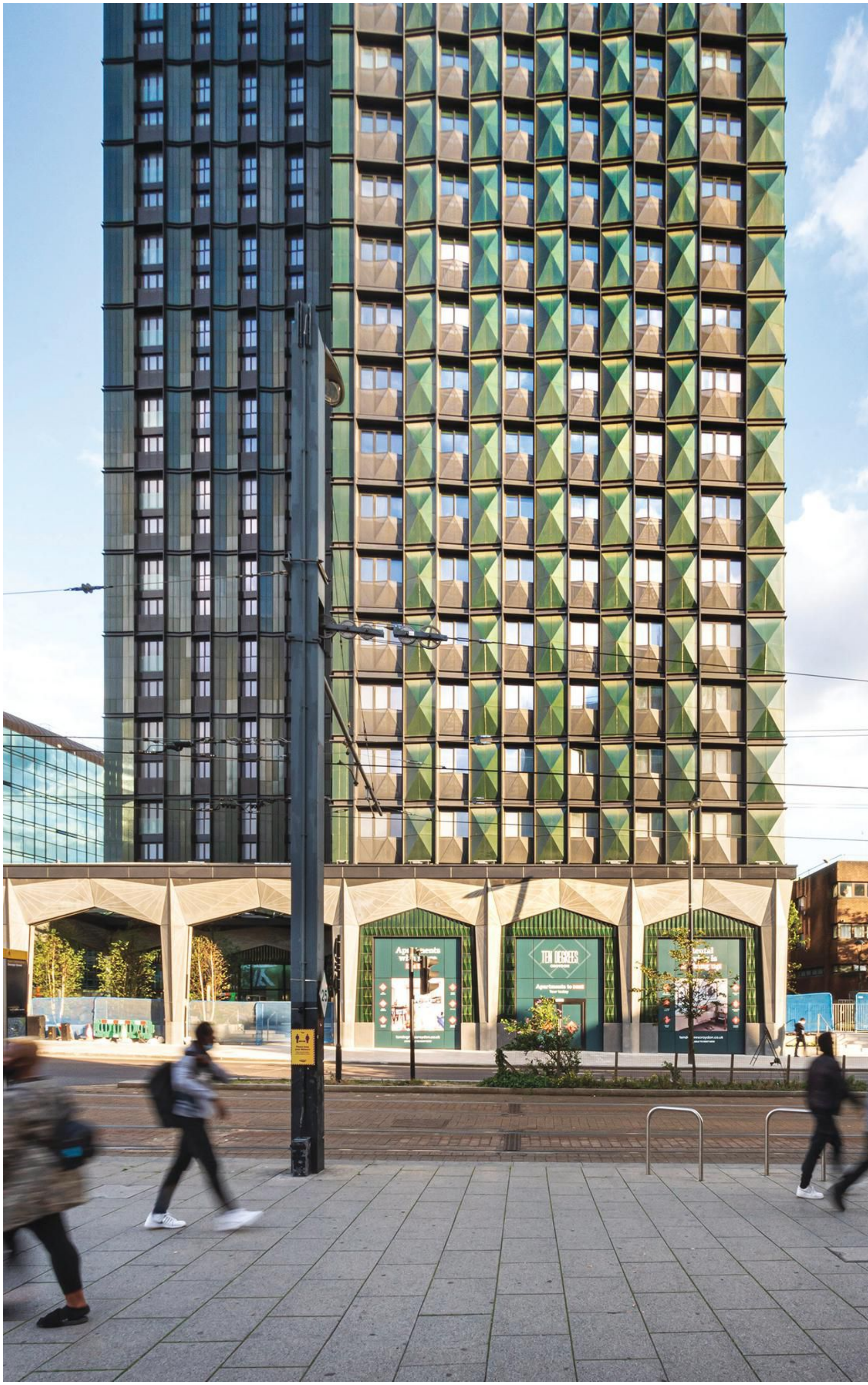
The project will include nine new buildings, ranging from seven to 12 stories, with site-built steel-braced frames for lateral support and fully integrated steel-framed volumetric modules. In a move that eliminates the need for scaffolding on-site, each of the modules will be pre-clad in structural insulated sheathing. At the factory, the modules are fitted with interior finishes, bathroom pods, mechanical systems, and the like.

"You're effectively shipping a fully complete unit, which requires significant detailing and pre-planning, but, once on-site, can be simply lifted into position," explains Arup principal David Farnsworth.

Across the pond, in London, architecture firm HTA Design and Tide Construction, along with its manufacturing sister company Vision Volumetric, is reshaping the skyline with a series of modular high-rises: Ten Degrees and College Road, in Croydon, at 440 and 540 feet tall, are some of the tallest in the world. "We don't approach our modular projects as a route to reducing cost. We focus on quality and ensuring that all of our techniques are more efficient than traditional building," notes HTA managing partner Simon Bayliss. "We drive down costs through reducing defects and waste, with faster project delivery and higher-performing mechanical and enclosure systems."

The firm's typical modular projects are clad in a range of materials, like terra-cotta, and arranged in a variety of configurations to blend into their respective contexts and maximize developable space. The modules sit on top of a reinforced-concrete podium and are tied to a reinforced-concrete core. On average, the team can install 40 to 60 modules per week on an individual site—the factory output ranges from 40 to 60 volumetric units per week—and, in the case of Ten Degrees and College Road, both construction programs were completed ahead of schedule, in just over two years. Notably, HTA and Tide's collaboration and vertical integration yielded considerable time savings prior to construction, which, in both circumstances, went from concept design through construction in less than four years. "In London, a similar process by traditional means could take upwards of 10 years," says HTA partner Simon Toplis.

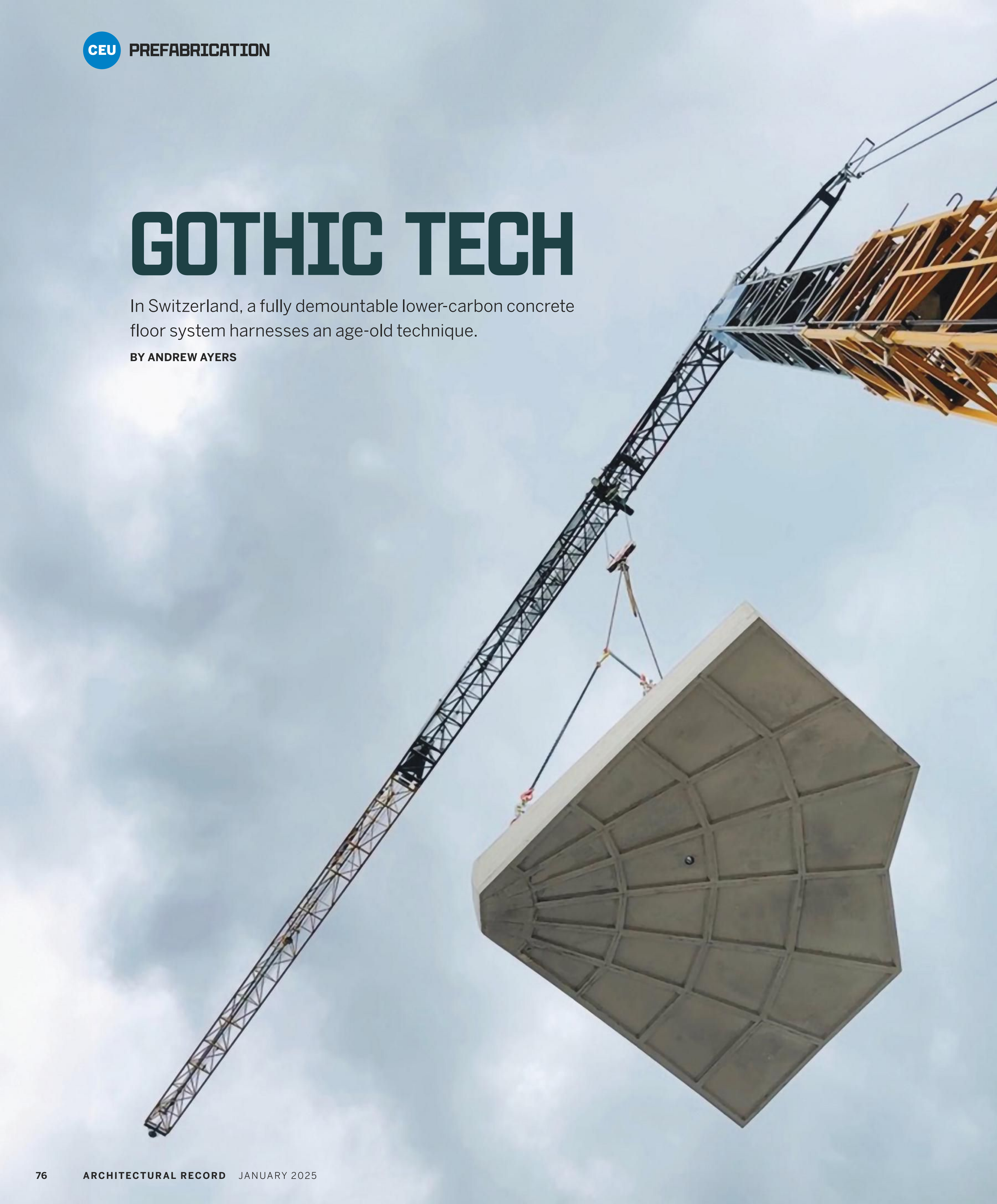
The benefits of modular construction are manifold; realizing them requires extraordinary up-front capital requirements and a consistent project pipeline. However, the market is calling for ever more comprehensive productivity gains, to meet the demands of the moment. "We get approached from cities all over the world that explain their unique housing problem, and it's the same problem that everyone else is experiencing—namely, high labor costs, material shortages, and planning delays," says Bayliss. "Despite the challenges often associated with investing in modular construction, it is an effective means to address these problems." The demand is certainly there; we'll see if the market follows. ■

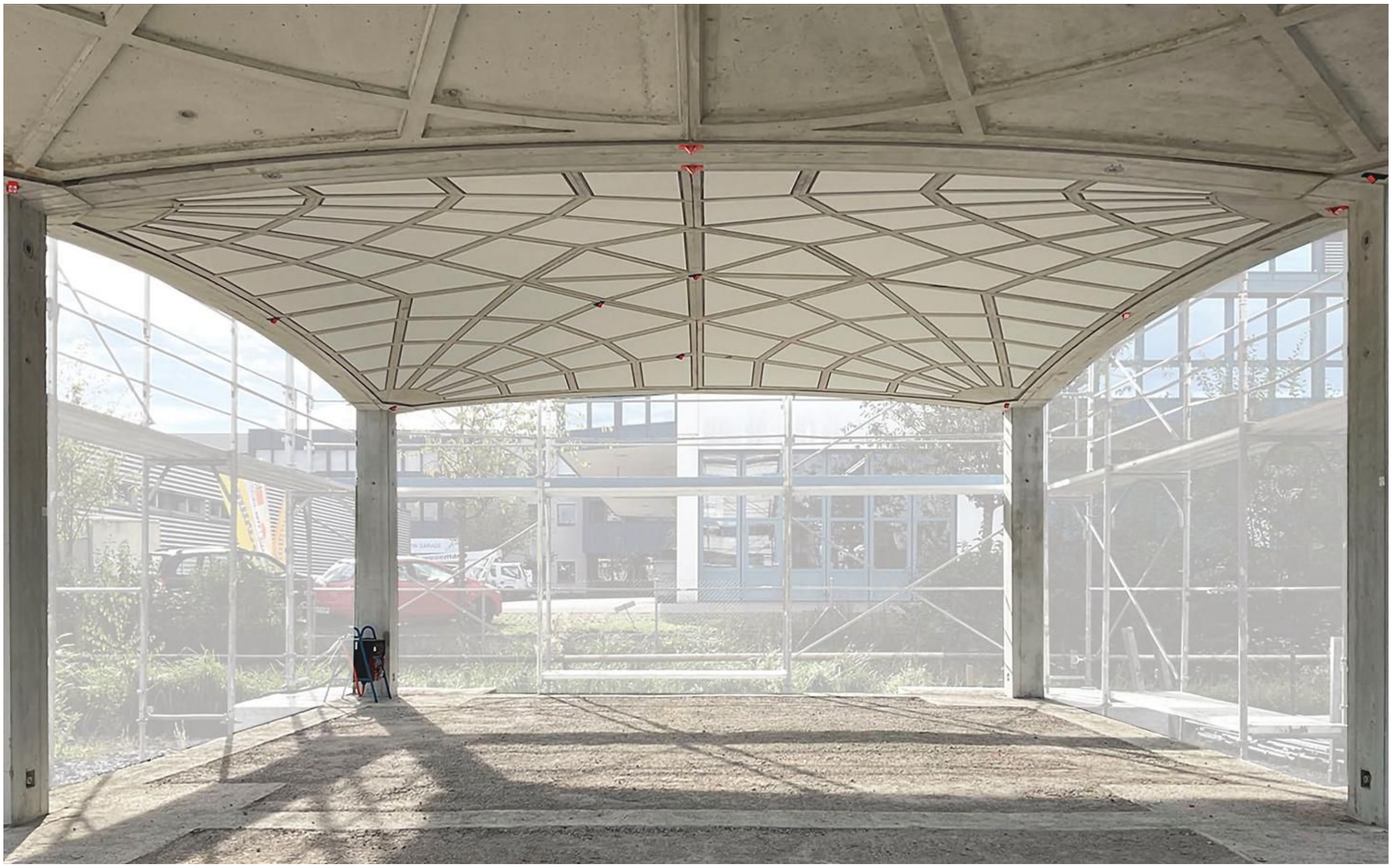


GOTHIC TECH

In Switzerland, a fully demountable lower-carbon concrete floor system harnesses an age-old technique.

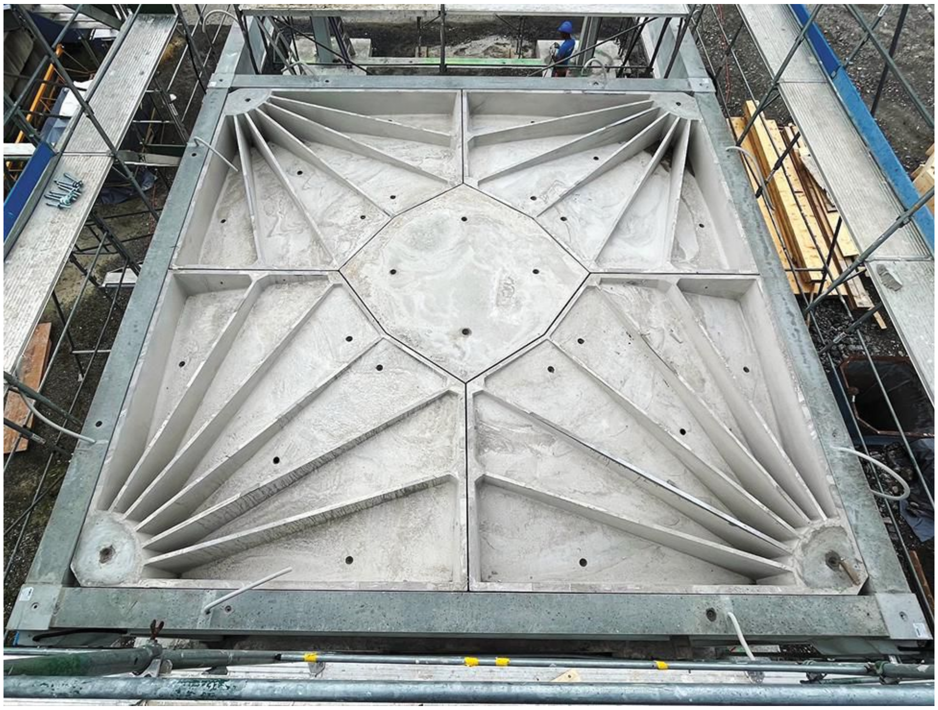
BY ANDREW AYERS





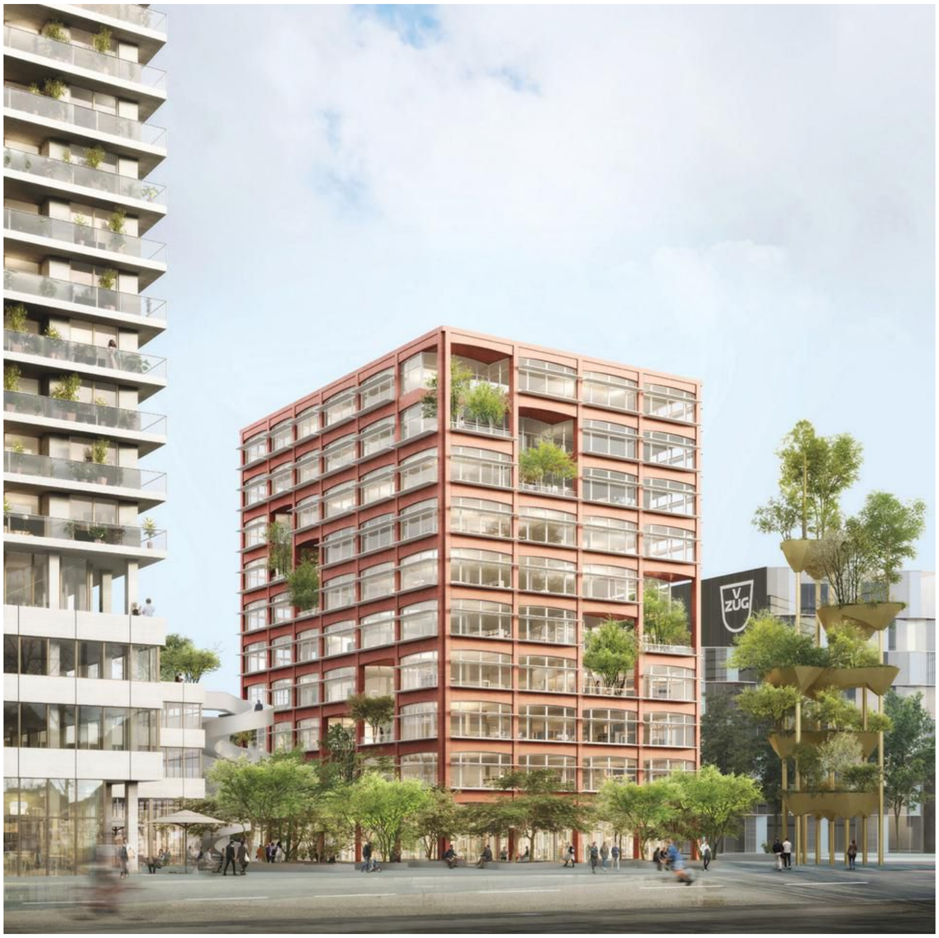
IMAGINE fully demountable, prefabricated concrete floors that reduce emissions by two-thirds and are beautiful to boot. This is what Swiss company Vaulted claims to deliver with its Rippmann Floor System (RFS), named for the late Matthias Rippmann, a member of the Block Research Group (BRG) at ETH Zurich, Switzerland's prestigious polytechnic university.

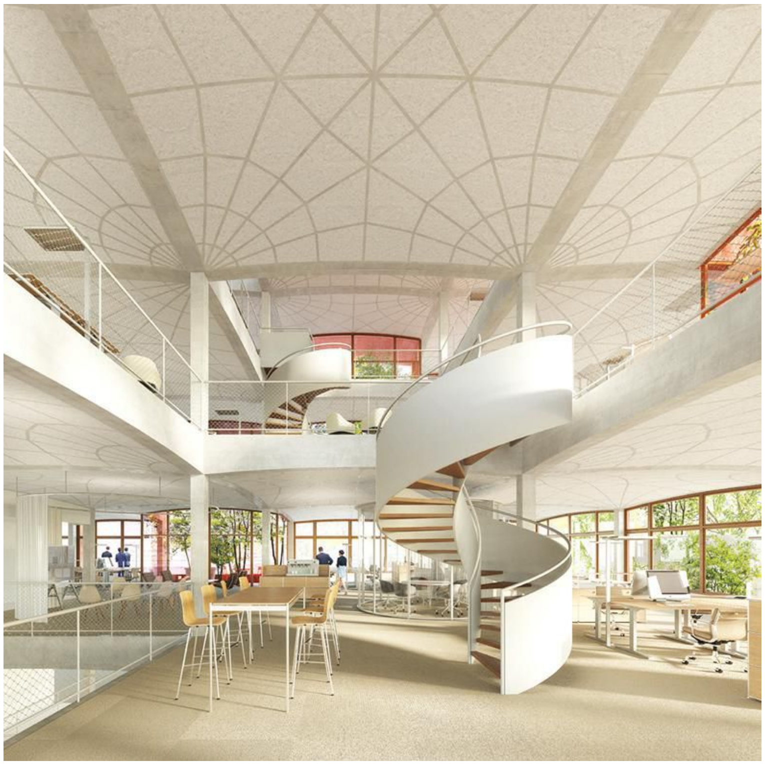
The RFS uses concrete only "where it wants to be in compression," says the company. Unlike the Gothic technology on which they are based, Vaulted's RFS shells are stiffened by ribs located on their hidden, upper surface, with the lines of force inscribed on their visible face underneath. As currently available, they come in two versions: double span (RFS-D) and single span (RFS-S). While the RFS-D modules fit together to form what resembles a classic quadripartite vault, which is to say curved in two directions and supported at the corners of its square perimeter, RFS-S is curved in just one direction, its components forming a barrel vault that must be supported along its two edges. This dual offer, says Francesco Ranaudo, Vaulted's CEO, responds to RFS-D's



THE FLOOR SYSTEM's parts are craned into position (left). Lines of force are inscribed on the underside of the panels (top). The pieces resemble a quadripartite vault once assembled (above).

PHOTOGRAPHY: © PHILIPPE BLOCK





CREATOWER I, in Switzerland, will be the first new building to use Vaulted's technology (left). The interior will feature double-height spaces that could be filled in at a later date (left, below).

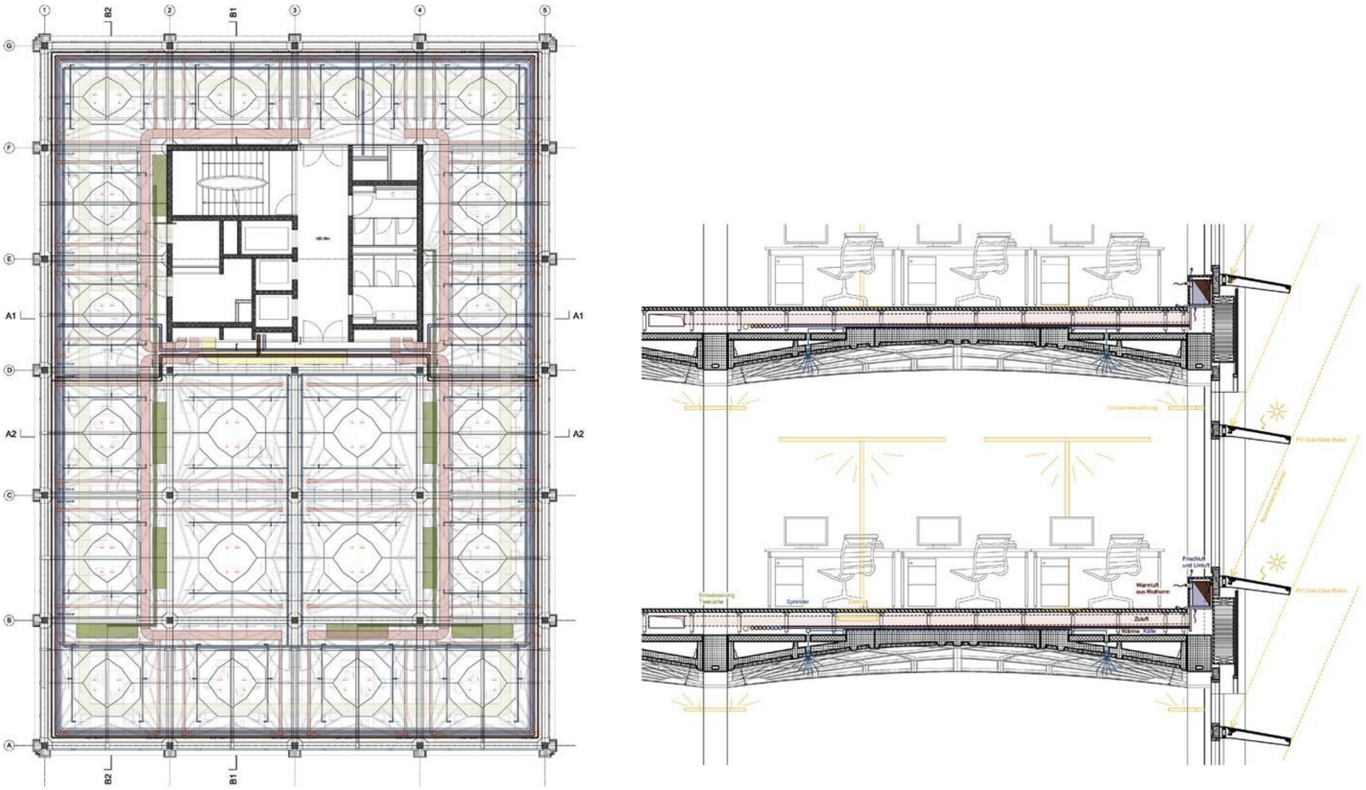
limited flexibility with respect to internal partitions, since running them through the middle of the vault is inelegant; with its narrower spans, RFS-S is better suited to housing, for example, which generally requires smaller rooms than offices. "We're really going back to a tectonic appreciation of architecture," comments Ranaudo.

The average flat concrete floor slab, he continues, is around 10 inches thick, whereas the RFS shells measure only 2½ to 3 inches (which, by chance, is just the right amount for thermal insulation). The only reason the shells might get thicker is for fire protection, although tests have shown they will resist for at least an hour. If the vault's perimeter dimensions increase, it will rise higher to cope with the reconfigured forces. "If necessary, we can make very shallow vaults," clarifies Ranaudo, "but that means you'll need either more mass or more steel reinforcement in whatever part of the structure is absorbing the lateral thrust." Where the building structure is concerned, Vaulted offers an in-house design service for those unwilling to tackle the calculations. As for the concrete, "we can use any type we like," indicates Ranaudo, "but we avoid the strongest ones, since they're the most polluting and also pose fire-safety problems." Vaulted is currently collaborating with Swiss construction giant Holcim, which is developing various low-carbon concretes.

In a few years, Vaulted hopes to offer a standardized range of products with detailed installation instructions, but for now the firm is offering "customized mass-production" solutions. Vaulted's involvement begins at the concept-design phase, to make sure the shells conform to the building's structural grid and to accommodate any irregularities. Mounting the RFS on-site requires no specialized workers or equipment.

Vaulted emerged from BRG founder Philippe Block's Ph.D. research into assessing the performance of masonry vaults. "He wondered how you might use his analytical technique as a design tool," recalls Ranaudo, "after which Matthias Rippmann took things a step further by developing the RhinoVAULT plug-in in 2012." Over the following decade, BRG began to develop funicular-floor prototypes in concrete and,

IMAGES: © PONNIE IMAGES



CONSTRUCTION CONCEPT AND HVAC DESIGN DRAWINGS

in 2021, tested the idea as a poured-in-place version at HiLo, part of a life-size experiment in low-carbon construction at Dübendorf, Switzerland. "After HiLo, I began researching the possibilities of prefabrication," continues Ranaudo (also an architect and engineer, who joined BRG in 2018). In 2023, alongside Block and BRG codirector Tom Van Mele, he cofounded Vaulted as an ETH spinoff, and now works full-time for the company.

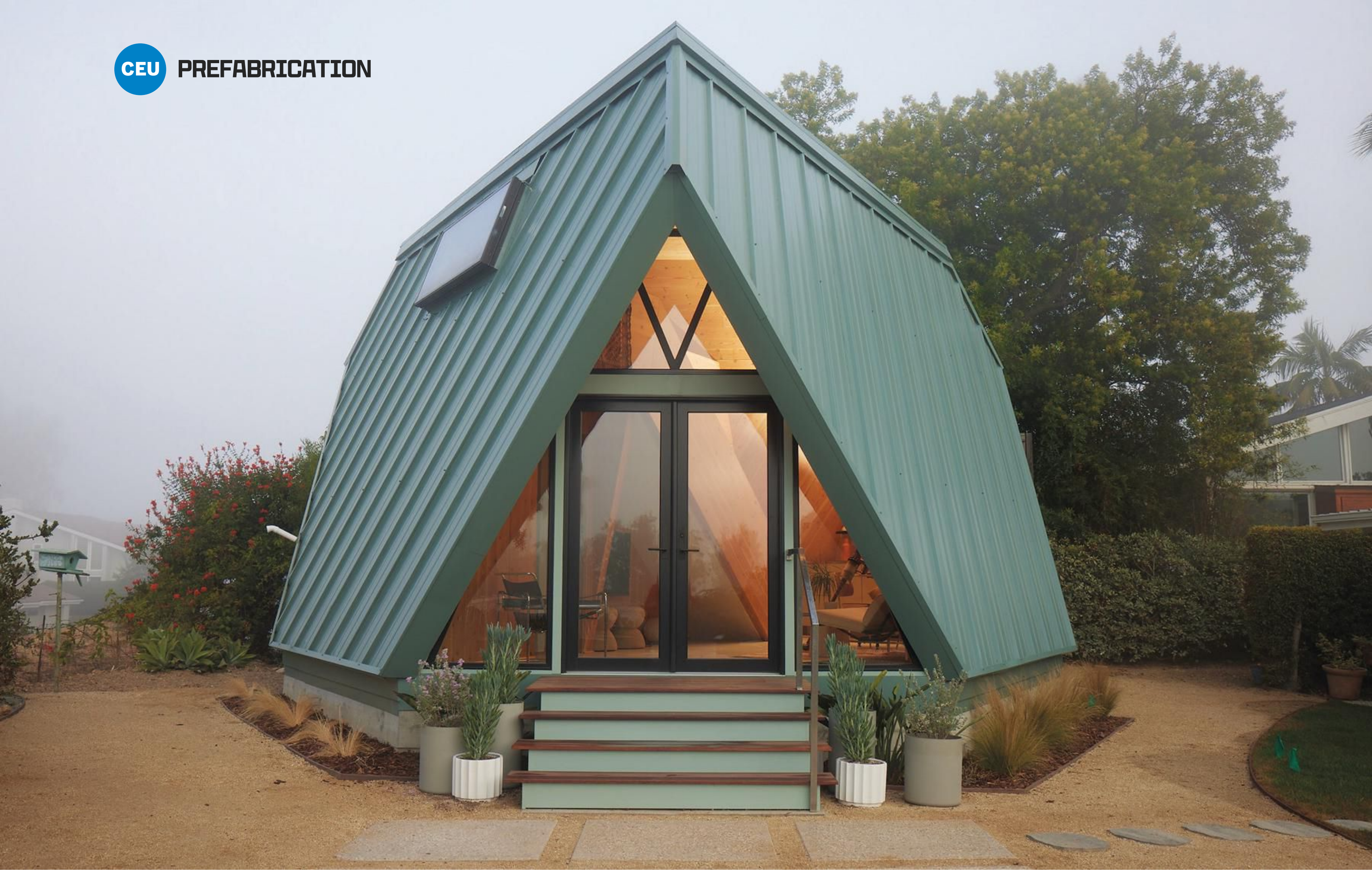
The first new building to complete using Vaulted's RFS system will probably be CreaTower I in the Swiss city of Zug. Designed by Zurich-based architect Gigon Guyer, the 10-story office block is due in 2028. As partner Stefan Thommen explains, the decision to try out the technology arose from a design studio that cofounder Mike Guyer taught with Block at ETH. In Zug, the height restriction of 131 feet led Gigon Guyer to request shallower vaults than would be optimal, so as to squeeze in the tall floors requested by the client. Where the supporting structure was concerned, the architects designed a pre-tensed, prefabricated concrete frame engineered not only to absorb wind load and vault thrust, but also to ensure flexibility. "If you optimize, you remove redundancy, but you may also be removing the ability to accommodate a change in use," explains Ranaudo. To future-proof, the capacity to handle different loads and situations must be anticipated—at CreaTower I, Vaulted had to demonstrate it could fill in double-height spaces with supplementary floor shells at a later date.

Gigon Guyer's building will run HVAC and wiring under raised floors, although other solutions are possible—ducts could be dissimulated within the thicker parts of the vaults or hung beneath them, says Ranaudo. In Switzerland, the technology has run up against the country's stringent acoustic regulations, which deem the RFS shells too thin: Gigon Guyer has added nonstructural concrete slabs nearly 4 inches thick, to meet requirements. In its current bespoke form, the RFS is also more expensive than classic floor slabs, despite the considerable savings in cement, aggregate, and steel. "If CO_2 emissions were more strongly taxed, there would be a greater incentive to adopt it," comments Thommen.

"We made a strategic decision to focus on Switzerland, since we know it so well,

STRUCTURAL MODEL

and to build our reputation here," says Ranaudo. "But we've designed the floor to be compliant with codes in the E.U., the U.S., and everywhere else. Taking Vaulted further will essentially be a question of opportunity." ■



A PAD IN A POD

A tiny mass-timber structure offers a possible solution to a very big housing problem.

BY RUSSELL FORTMEYER

UNLIKE MANY of the prefabricated accessory dwelling units (ADUs) flooding the California market, the Polyhaus does not fit on a flatbed truck fully assembled. The polyhedron-shaped house was conceived by Daniel López-Pérez as a solution for expediently producing quality housing at scale in the smallest footprint possible, rather than as a rectangular box for ease of shipping. With his wife and Polyhaus LLC cofounder, Celine Vargas, López-Pérez built the first two-story, 540-square-foot proof-of-concept in 2024 in the backyard of the couple's 1962 Palmer & Krisel house, in San Diego.

López-Pérez, who is professor and architecture-program director at the University of San Diego, developed the Polyhaus system by starting with a simple cube and then repeatedly truncating the edges until he optimized the form for the largest volume and smallest footprint. The 440-square-foot ground floor includes a living room, kitchen, bathroom, and nook for a desk and washer/dryer, with the bedroom on the 100-square-foot mezzanine. "Polyhaus is a design and construction-technology company," says López-Pérez, which he contrasts to ADU manufacturers that provide a built product. The couple view their 17-foot, 4-inch-tall Polyhaus as a research-and-development investment to bring the timber innovations revolutionizing large-scale construction down to smaller scales.

The house's primary structure and envelope consist of 64 individually cut Douglas fir cross-laminated-timber (CLT) panels, produced by Vaagen Timbers in Colville, Washington. López-Pérez says the structural engineer, Fast + Epp, from Vancouver, British Columbia, estimated that the nonlinear structure of the CLT panels provides significant redundancy compared to a simple stud-framed house. The floor panels are five ply, 7½ inches thick, while the rest are three ply, 4½ inches. "The virtue of this truncated polyhedron shape is that we have 25 panel shapes that repeat themselves, so it reduces details immensely," says López-Pérez. In his view, the project has only two architectural details—the structural connections fastened with bolted metal plates, and the simpler splines between panels that slot together.

Site preparation took one week, which included pouring a concrete foundation stem wall. Electrical and plumbing services were

PHOTOGRAPHY: © ANDY CROSS AND CODY CLOUD

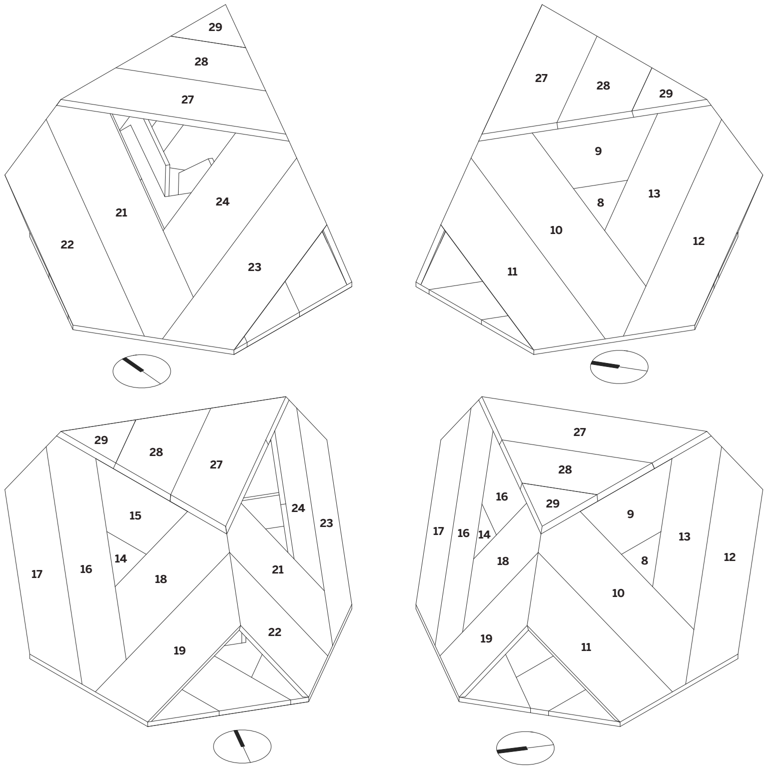
THE FIRST POLYHAUS (opposite and right), a 540-square-foot, two-story metal-clad and CLT structure, was built last year in San Diego.

installed under the floor and extend up to two conventionally framed walls serving the kitchen and the bathroom. With the platform floor installed, work could begin on piecing the walls together until they formed a self-supporting diaphragm. Vaagen stacked each panel on the truck in the order in which it would be unloaded with a crane and set into place. Installation of the panels took a crew of three workers only three days on-site. Following that, a vapor barrier was applied, seams sealed, and Kingspan insulated metal panels were screwed directly into the CLT.

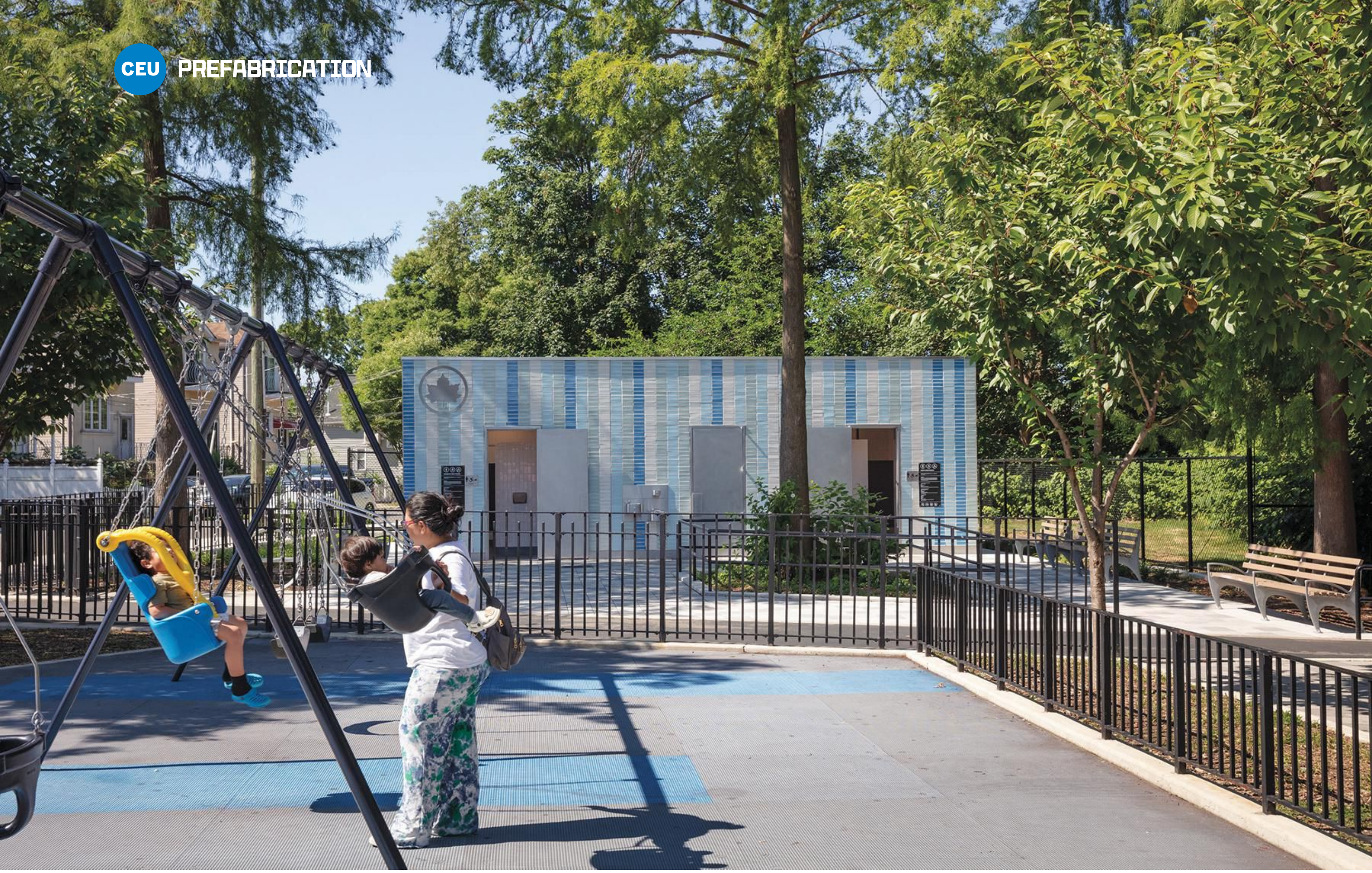
A predictable, kit-of-parts supply line helped the couple reduce the price significantly, with the smallest model costing approximately $300,000—including San Diego permitting and other development fees—with a construction schedule of 12 weeks, from site work to turning the key in the door. The couple estimates 40 percent of that cost is labor. “We scheduled each trade separately for this project, but we were also testing things as we went through construction,” Vargas says. One way to save time would be to eliminate the concrete-foundation requirement, which the couple allowed for by also pre-permitting a version of the house that sits on 26 earth screws. Vargas estimates they could get the construction time down to eight weeks or less. Building a single-family house can easily cost between $600 to $1,200 per square foot in California, compared to $550 per square foot for Polyhaus, which is comparable to more conventional ADUs.

The couple recently secured a patent for the Polyhaus system, and plan to offer a business model for licensing the technology to builders this year. Vargas says, given San Diego’s lack of housing supply, the licensing model would allow them to accelerate production. They also envision small-scale developers, who could build six or more on a lot, as the primary market. Since California land costs are so high, López-Pérez suggests that infill lots could be developed along the lines of a bungalow court, providing a “missing middle” with a density between apartment buildings and houses. “It would open up the possibility of houses that are more flexible to multigenerational families,” he says, “with people at different stages in life.” ■

Russell Fortmeyer is a sustainability consultant and former RECORD *editor who lives in Los Angeles.*



ISOMETRIC VIEWS (PANELS NUMBERED IN ORDER OF ASSEMBLY)



TRANSPORT A POTTY

New York's first modular public restroom prioritizes speed, budget, and easy upkeep.

BY PANSY SCHULMAN

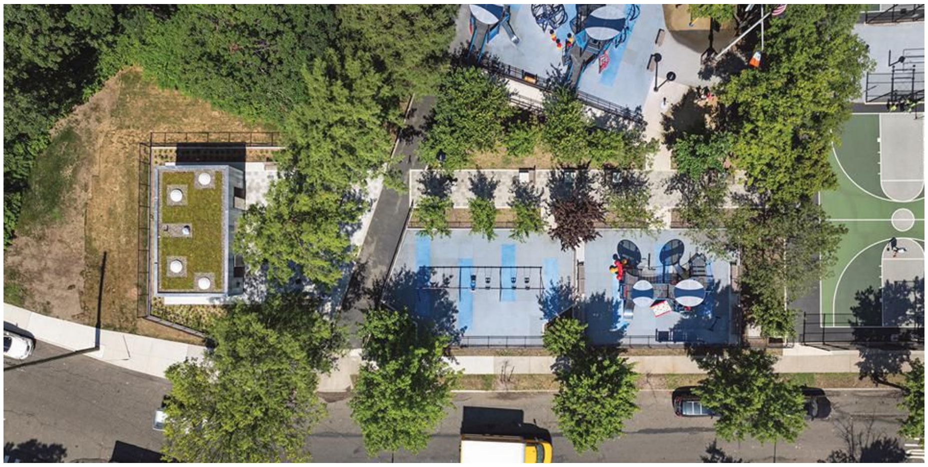
A QUIET residential block on Staten Island is the unlikely location of a potentially game-changing project: the first modularly constructed public bathroom in New York. The modest structure, designed by 1100 Architect, was completed last winter and has been a boon for visitors at Lopez Playground, which previously had no public facilities within walking distance.

Composed of three steel-frame modules, the restroom is enclosed with a facade of structural glazed tile, making it durable, low-maintenance, and vandal-resistant. At 34 feet long and 20 feet wide, the design aligns with dimension standards for New York City Department of Parks & Recreation (NYC Parks), and consists of separate men's and women's toilets flanking a mechanical room and employee storage space. Small skylights and generous windows, treated with a translucent film for privacy, bring natural light inside the three-stall restrooms. The architects also incorporated a green roof, adding a green touch to the ultra-pragmatic program.

In 2019, 1100 Architect was approached by NYC Parks to develop a feasible modular system for public restrooms. The firm had previously been commissioned by the agency to design a pavilion and maintenance center for the new Calvert Vaux Park in South Brooklyn, completed in 2023. "The Parks Department wanted a system that would hopefully be more cost-effective but, in particular, more time-effective," to minimize disruption of park functions, says founding principal Juergen Riehm.

The design team looked at different construction schemes, including one developed by the National Park Service that uses concrete modules for restroom construction. But it found the material wasn't feasible here—efficient transportation through New York's dense grid posed strict constraints on size and weight. At 18,000 pounds each, the resulting 11-foot, 6-inch by 19-foot, 4-inch steel-frame modules are a fifth as heavy as a concrete equivalent and, at a total construction cost of $2.5 million, 15 percent less expensive (and 50 percent faster) to build.

In addition to honing module dimensions, 1100's design prioritized easy fabrication and maintenance, using standard materials and construction methodologies. This allows access to a greater pool of local contractors



ABUTTING a small playground (opposite), the modular restroom is outfitted with a green roof (above) and skylights that allow for abundant daylight inside (right).

and makes components easier to maintain and replace in the long run. “That’s an issue with modular construction, where it’s so hyper-optimized that it creates this singular product,” says senior associate Jean-Cédric de Foy. “This one is designed to work with NYC Parks broadly and its maintenance team, relying on materials they already are familiar with.”

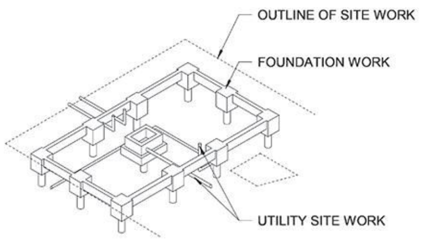
After the firm finalized the design, off-site fabrication took six months to complete, concurrent with light on-site foundation work that could be completed within a few months. The modules were then transported from the fabricator, Modlogiq, in New Holland, Pennsylvania, and installed in a single day.

The Staten Island project has already affected plans to install more public toilets. A press officer for NYC Parks says the department is employing modular construction for two new public facilities at Fort Washington Park in Manhattan and Grant Park in the Bronx, though did not specify whether these projects would utilize 1100’s system.

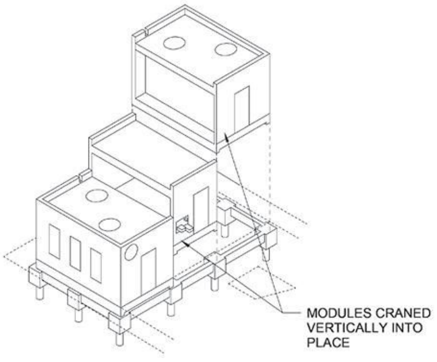
Its success, though, comes at a time when new solutions are desperately needed to address the city’s paltry and ailing stock of public facilities. The latest data from the city show that New York has only 12 public restrooms per 100,000 people, lagging far behind other major American cities. San Francisco, for instance, now has 26 for every 100,000, after partnering with a nonprofit in 2014 to aggressively spearhead an expansion campaign. Last June, New York mayor Eric Adams passed the “Ur In Luck” bill, which included building 46 new restrooms and renovating 36 others over the next five years. But critics say this isn’t enough. Advocates and elected officials have pushed for legislation that will set a more ambitious target for the city: one public restroom for every 2,000 residents by 2035.

A report released this fall highlighted the scope of the challenge by casting a sobering light on the state of the city’s existing facilities. Of the 1,000 public restrooms scattered across the five boroughs, almost a third lacked basic amenities like trash receptacles, while 10 percent remained shuttered during their scheduled operating hours; 40 percent suffered from persistent litter problems, and 23 percent failed to meet basic sanitation standards. In other words, New York faces an infrastructural crisis where public amenities struggle to meet basic dignity and sanitary requirements.

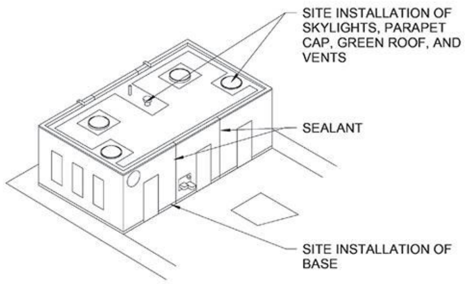
In the long term, this will require broader legislation that directs funds toward maintenance and upkeep as well as construction. Right now, though, 1100 Architect’s modular system charts a potential path forward for lawmakers looking to quickly and affordably supplement the city’s meager supply. ■



SITE WORK

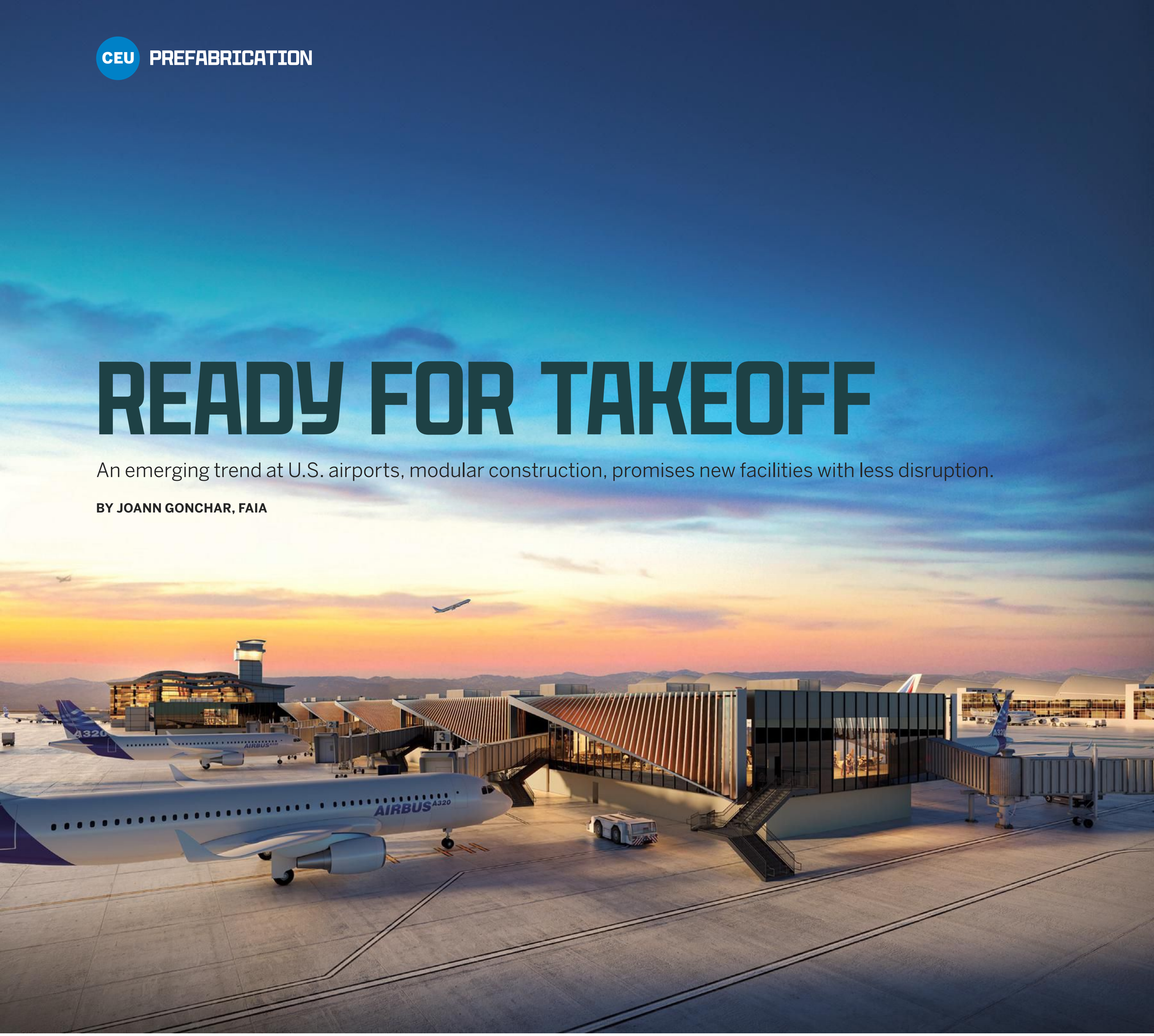


MODULE INSTALLATION


SITE INSTALLATION OF SKYLIGHTS, PARAPET CAP, GREEN ROOF, AND VENTS
SEALANT
SITE INSTALLATION OF BASE

SITE-INSTALLATION ELEMENTS

PHOTOGRAPHY: © TY COLE



READY FOR TAKEOFF

An emerging trend at U.S. airports, modular construction, promises new facilities with less disruption.

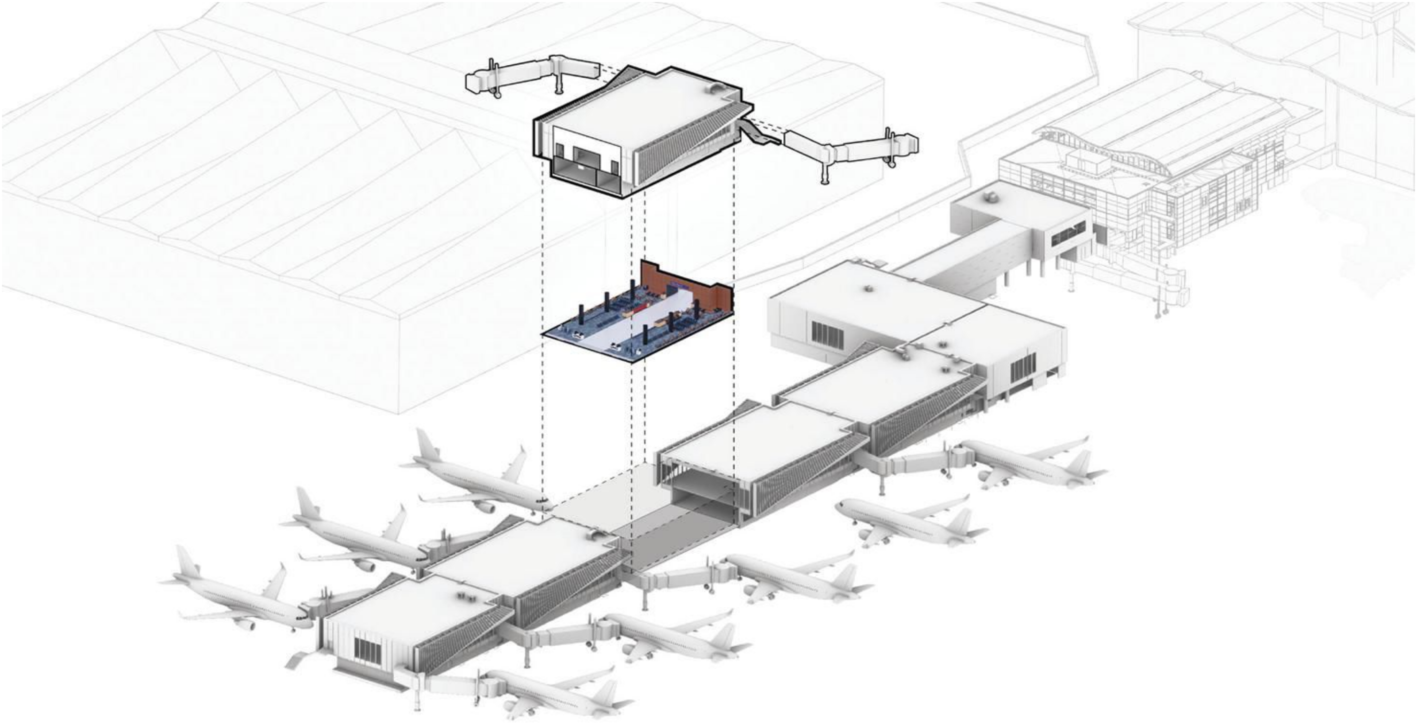
BY JOANN GONCHAR, FAIA

EXPANSIONS and modernizations at airports can be logistically tricky. They often involve shutdowns and delays, adding to travel headaches and causing a loss of revenue. But prefabrication and modular construction are emerging trends for airports, promising benefits that include fewer disruptions, shorter project timelines, and safer work sites, according to advocates of the methodology.

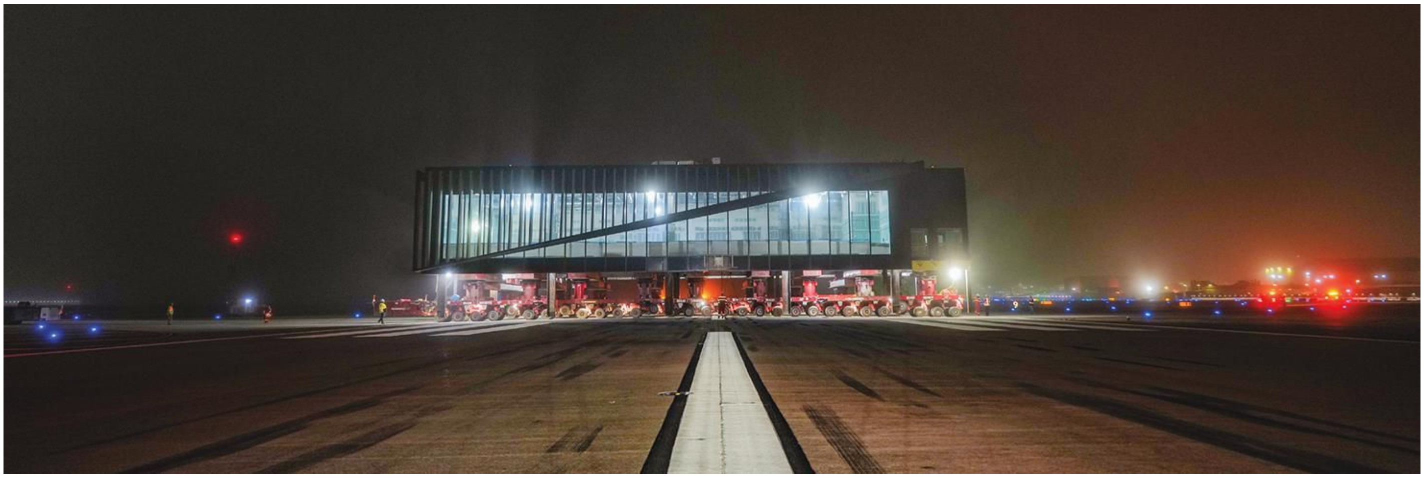
Current projects at Los Angeles International Airport (LAX) and Hartsfield-Jackson Atlanta International Airport (ATL), while not the first in the country to use remote construction, nevertheless illustrate the potential of different variations on the approach. LAX is extending its Midfield Satellite Concourse to the south, adding 146,000 square feet and eight gates for narrow-body aircraft in a process that design architect Woods Bagot calls off-site construction and relocation (OCR). In Atlanta, architects Corgan and Goode Van Slyke are relying on a hybrid of modular and traditional construction to expand ATL's 44-year-old Concourse D by 75 percent to accommodate larger airplanes and more travelers.

In the case of LAX, workers built nine aluminum-clad, steel-framed segments, with a typical one measuring 63 by 138 feet, in an assembly yard just outside the airfield operations area. Then, over nine nights this past October, with runways temporarily closed, crews from heavy-lifting company Mammoet transported the roughly 1,000-ton modules the 1¾ miles to the building site on specialized multiwheeled vehicles known as self-

IMAGES: COURTESY WOODS BAGOT (THIS PAGE); LOS ANGELES WORLD AIRPORTS (OPPOSITE)



MIDFIELD SATELLITE CONCOURSE SOUTH—AXONOMETRIC DIAGRAM

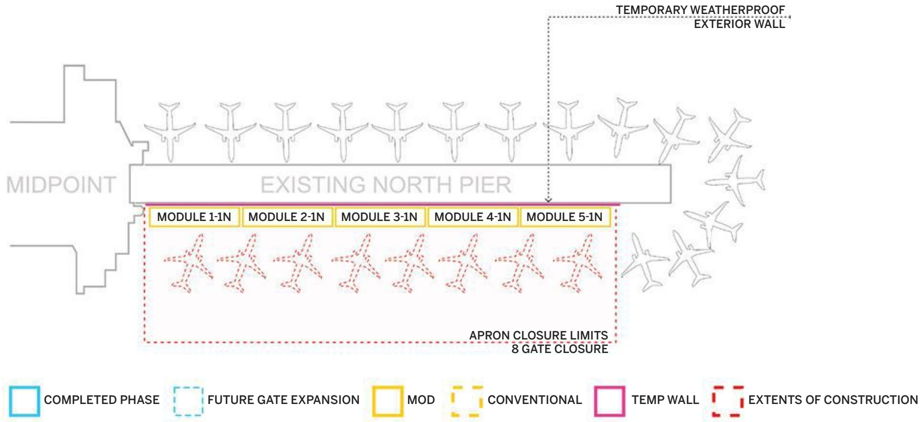


THE NEW concourse at LAX (rendering, opposite) will open late this year. Its segments were moved into place in October (above).

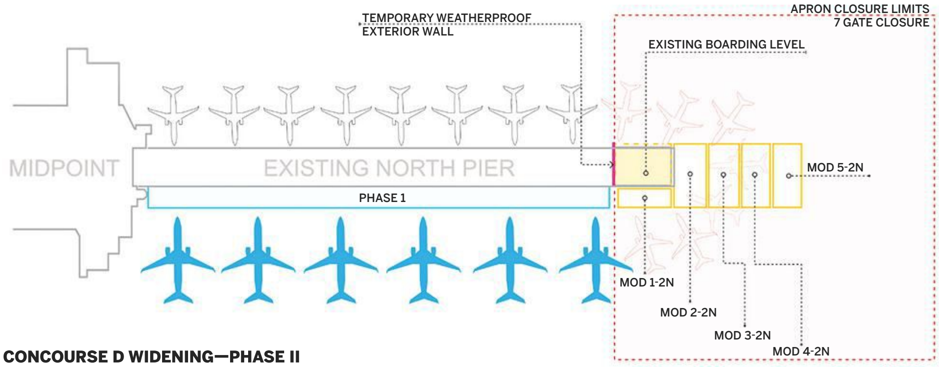
propelled modular transporters (SPMTs).

Ian Lomas, the chair of Woods Bagot's Los Angeles studio, says that the architecture of the new concourse is intentionally straightforward, but with proportions and geometry inspired by California Modernism. The modules do, however, have a feature that deviates from that era's mostly rectilinear forms: an angled and subtly curving brise soleil. The shading device allows for daylighting and views without the need for other measures to mitigate heat gain and glare, such as coatings or electrochromic glazing. And "it creates a simple ripple across the facade," says Lomas.

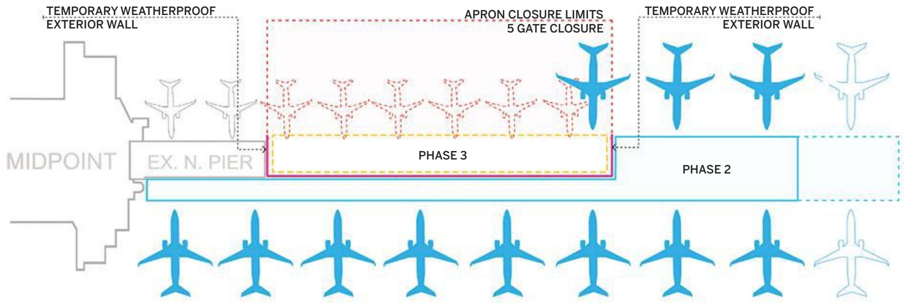
Structurally, each segment is its own building, laterally supported by a pair of moment-resisting frames in one direction and buckling-restrained braced frames in the other, explains Stuart Brumpton, project manager for Buro Happold, the expansion's structural engineer, as well as its sustainability, lighting, and acoustical consultant. The design takes into account the potential for intense seismic activity in the earthquake-prone region, but it also prevented damage of nonstructural components during the modules' transport, since their cladding, glazing, m/e/p services, partitions, and many interior finishes had already been installed. "We had to be more careful about deformation than we would for a typical building," says Derrick Roorda, Buro Hap-


TEMPORARY WEATHERPROOF EXTERIOR WALL
MIDPOINT
EXISTING NORTH PIER
MODULE 1-1N
MODULE 2-1N
MODULE 3-1N
MODULE 4-1N
MODULE 5-1N
APRON CLOSURE LIMITS
8 GATE CLOSURE
COMPLETED PHASE
FUTURE GATE EXPANSION
MOD
CONVENTIONAL
TEMP WALL
EXTENTS OF CONSTRUCTION

CONCOURSE D WIDENING—PHASE I


TEMPORARY WEATHERPROOF EXTERIOR WALL
APRON CLOSURE LIMITS
7 GATE CLOSURE
EXISTING BOARDING LEVEL
MIDPOINT
EXISTING NORTH PIER
PHASE 1
MOD 5-2N
MOD 1-2N
MOD 2-2N
MOD 3-2N
MOD 4-2N

CONCOURSE D WIDENING—PHASE II


TEMPORARY WEATHERPROOF EXTERIOR WALL
APRON CLOSURE LIMITS
5 GATE CLOSURE
TEMPORARY WEATHERPROOF EXTERIOR WALL
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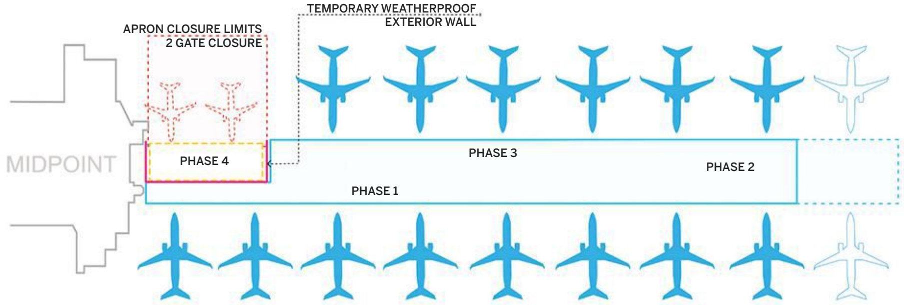
EX. N. PIER
PHASE 3
PHASE 2

CONCOURSE D WIDENING—PHASE III


TEMPORARY WEATHERPROOF EXTERIOR WALL
APRON CLOSURE LIMITS
2 GATE CLOSURE
MIDPOINT
PHASE 4
PHASE 3
PHASE 2
PHASE 1

CONCOURSE D WIDENING—PHASE IV

pold's U.S. technical director.

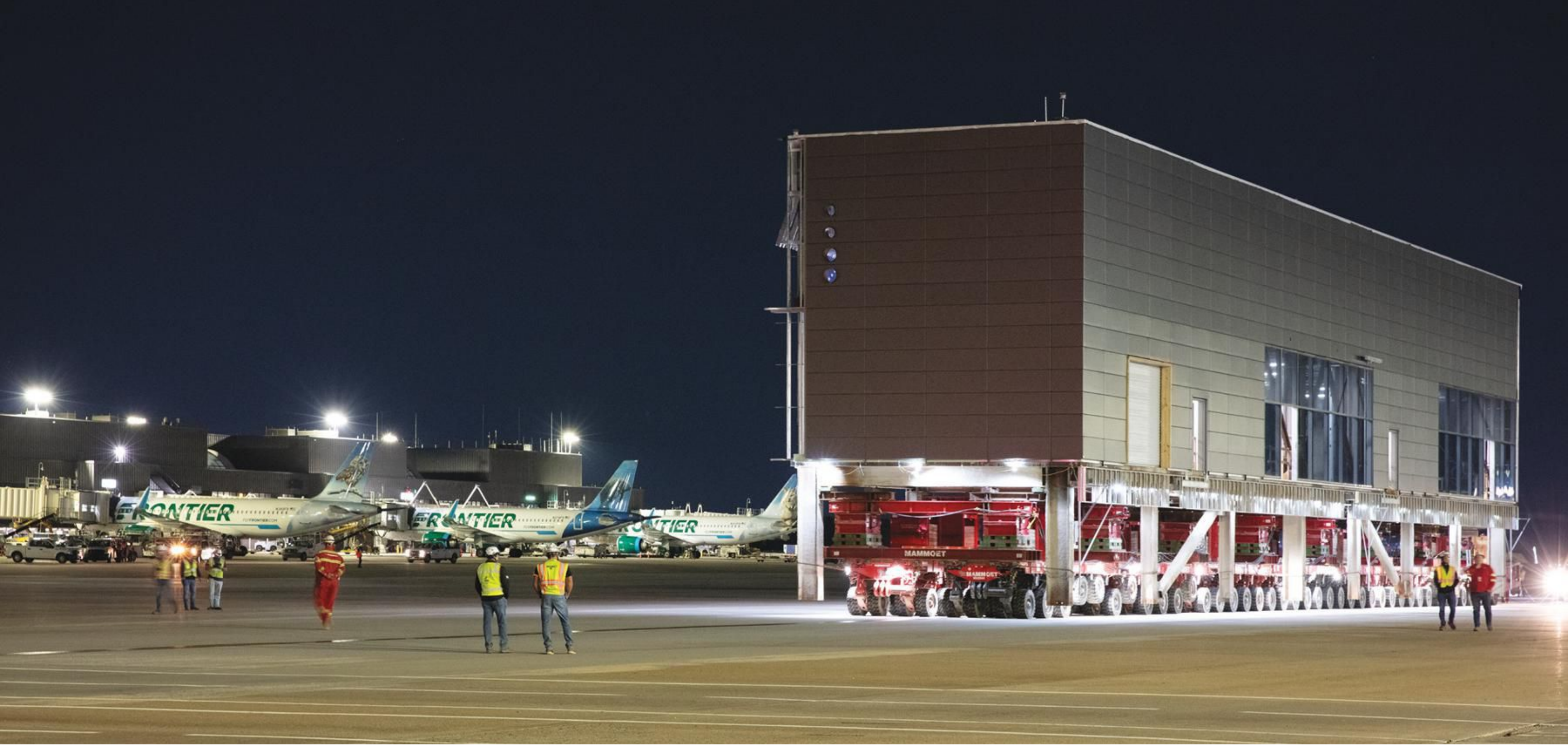
Although the segments will probably stay put for several decades, they have been designed with circularity in mind. One day they could be decoupled and moved to another part of the airport, and possibly be converted to a different use, such as office space, points out Lomas. And, because the connections are bolted (except where the modules are tied to their foundations), the segments could even be easily disassembled and the steel members readily reused.

With all nine modules now in place, workers are building the concourse's apron level, completing interior finishes, and installing the boarding bridges, among other tasks. Following a systems-commissioning process slated to start in March, the concourse will open in late 2025. According to Los Angeles World Airports, LAX's owner and operator, the OCR approach shortened the construction timeline by six months and saved $30 million. Many of these economies can be attributed to avoiding the security screening required for building on an active airfield—and the associated time and expense. In a traditionally constructed airport project, "not only personnel, but every bolt needs to go through the TSA," points out Roorda.

The team behind the expansion of Concourse D at ATL—the world's busiest airport, with more than 100 million travelers in 2023 alone—is taking a slightly different tack, combining prefabrication with stick-built construction. The $1.4 billion project will widen the structure from 65 feet to 99 feet and extend its overall length by 288 feet. Ross Payton, aviation-sector leader at Corgan, says the revamped concourse will be more comfortable for travelers. It will have a taller interior volume, with 18-foot ceilings; larger hold rooms, with 20 percent more seating; roomier circulation spaces; more food options; and larger restrooms. When both north and south wings are complete, Concourse D will have 34 gates for next-generation aircraft.

The expansion is being implemented in phases, so that no more than eight gates are taken out of operation at any one time, a mandate from the client, explains Todd McClendon, senior vice president of aviation with WSP, the project's program manager as part of a joint venture with H.J. Russell and Turner & Townsend. Starting with the north wing, contractors are building steel-framed, shoebox-like modules—some as large as 30 by 192 feet—in a nearby assembly yard and, as with the LAX project, moving them into place overnight with Mammoet's SPMTs.

IMAGES: COURTESY CORGAN/GOODE VAN SLYKE (LEFT, AND OPPOSITE, BOTTOM); CORGAN (OPPOSITE, TOP)


FRONTIER
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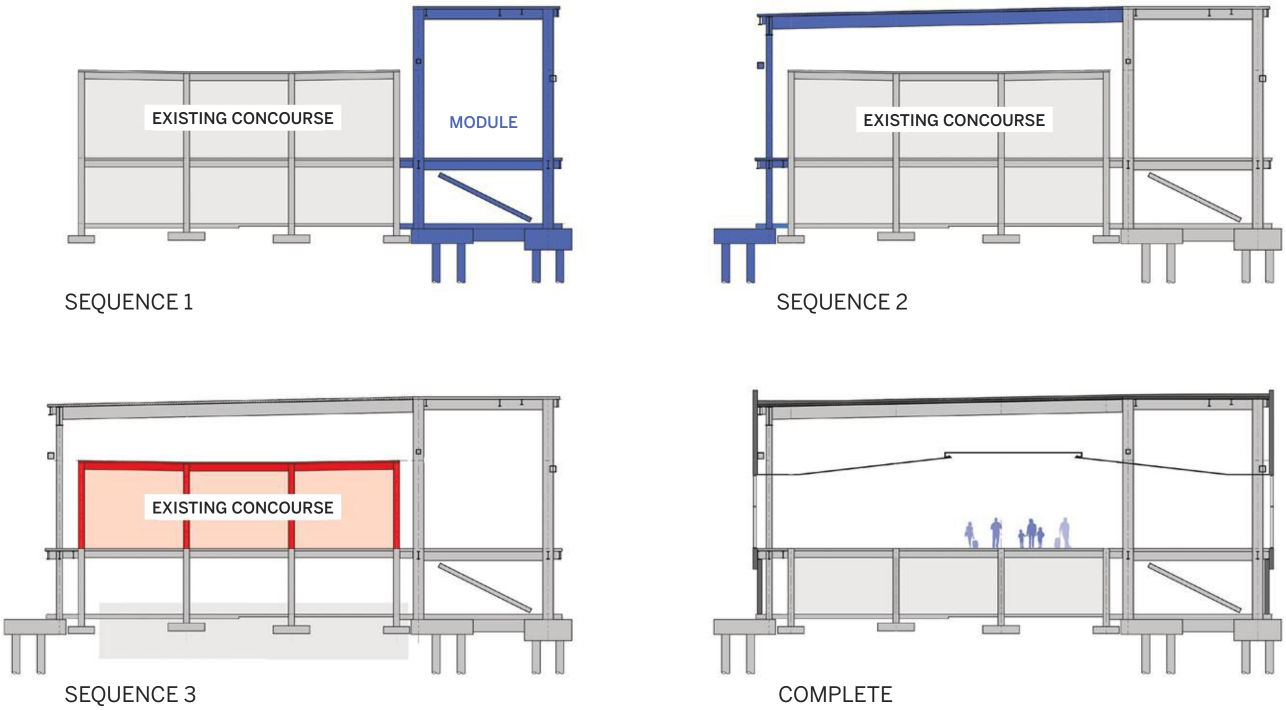
MAMMOET

IN ATLANTA, workers are moving the segments into place with specialized multi-wheeled vehicles (above), as they did at LAX.

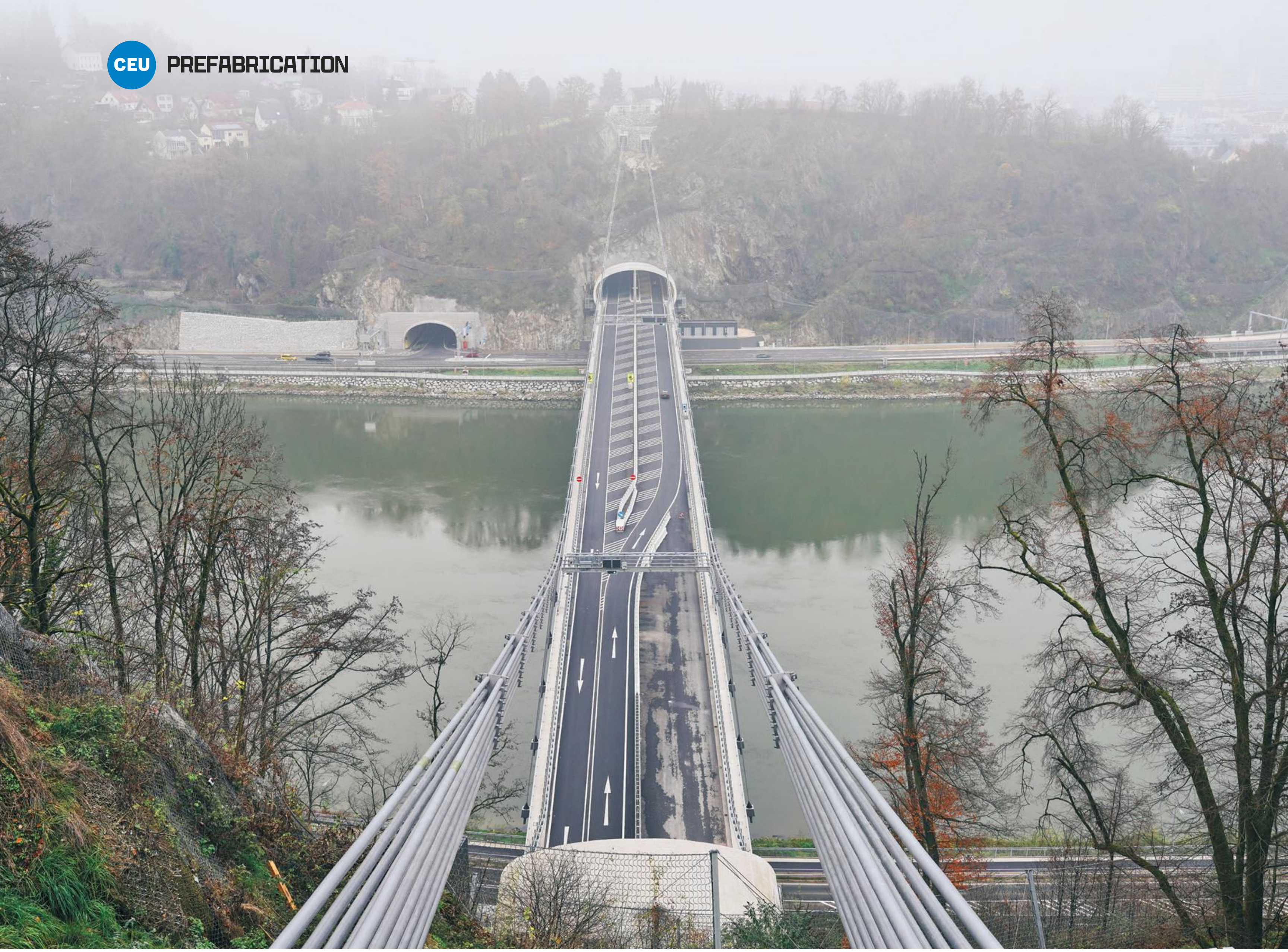

EXISTING CONCOURSE
MODULE
SEQUENCE 1
EXISTING CONCOURSE
SEQUENCE 2
EXISTING CONCOURSE
SEQUENCE 3
COMPLETE

CONCOURSE D WIDENING—CONSTRUCTION SEQUENCE

The team will next rely on more conventional techniques to build over the existing two-story concourse, and, once the new enclosure is complete, demolish the original upper level from within.

As of September, the first five modules had been put in place, with six new gates already in use. The north wing is expected to be complete by the summer of 2027, and the entire concourse two years later. According to WSP's initial estimates, the combination of off- and on-site construction will shave eight to 10 months off the project timeline compared to a more conventional approach. It will also keep a maximum number of gates in operation at any one time. "In terms of per-day gate revenue, it made total sense," says McClendon.

Prefabrication or modular construction won't be a good fit for every airport. But if the projects in Atlanta and Los Angeles deliver on their promises, we will be seeing many more relying on these strategies. ■



SPICK-AND-SPAN

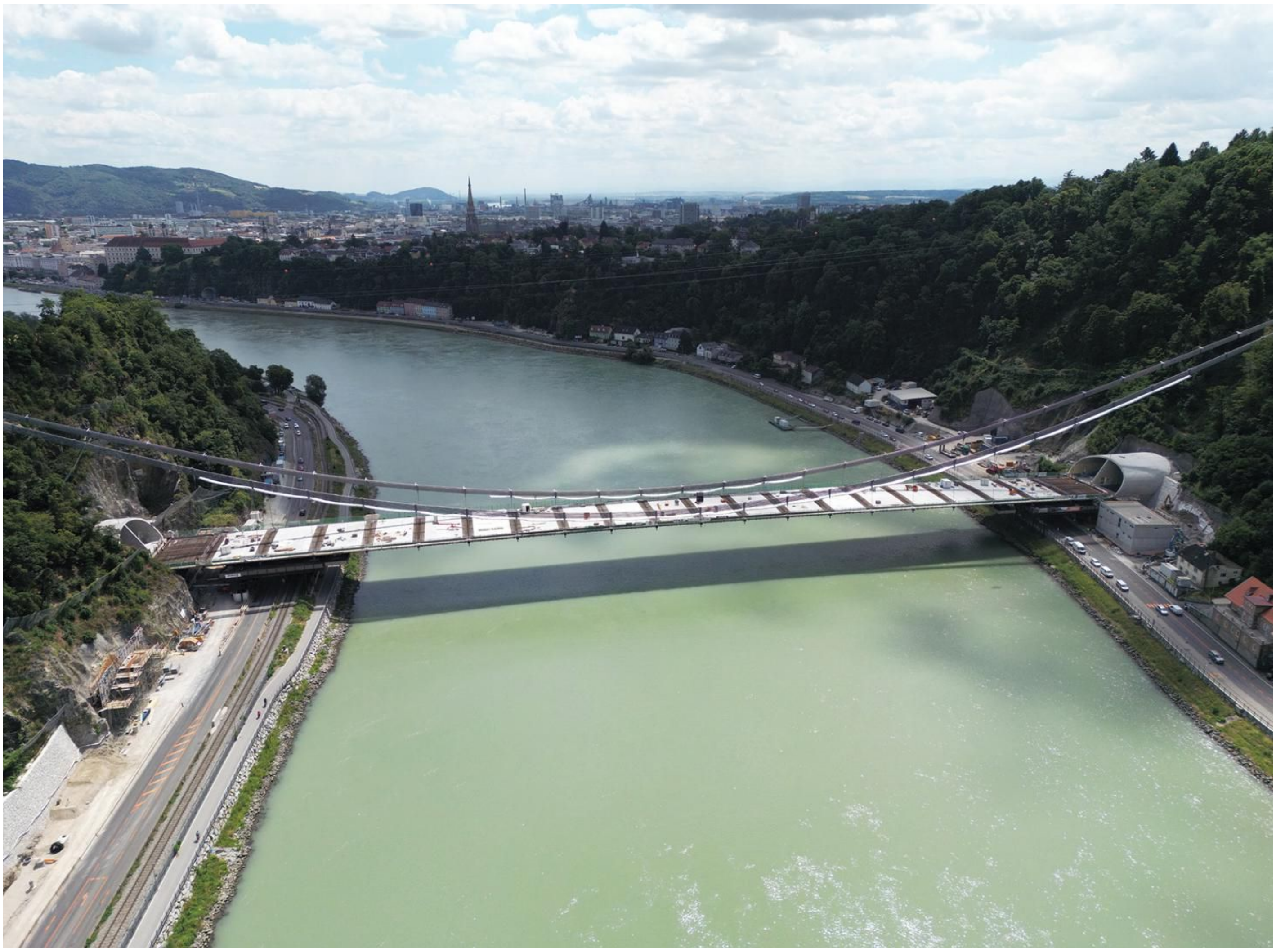
A new bridge suspends its steel-and-concrete deck between adjacent mountainsides.

BY MATTHEW MARANI

THE DANUBE RIVER flows from Germany's Black Forest some 1,800 miles across Europe before pouring into the Black Sea. As the continent's second-longest river, it has served as a west-to-east conduit, giving rise to the many cities that line its banks, like Vienna, Budapest, and, in north-central Austria, the provincial capital of Linz. There, the Danube Valley Bridge, completed in October 2024 and designed by Stuttgart, Germany–based engineer Schlaich Bergermann Partner (SPB), spans it—the longest earth-anchored suspension bridge in the world.

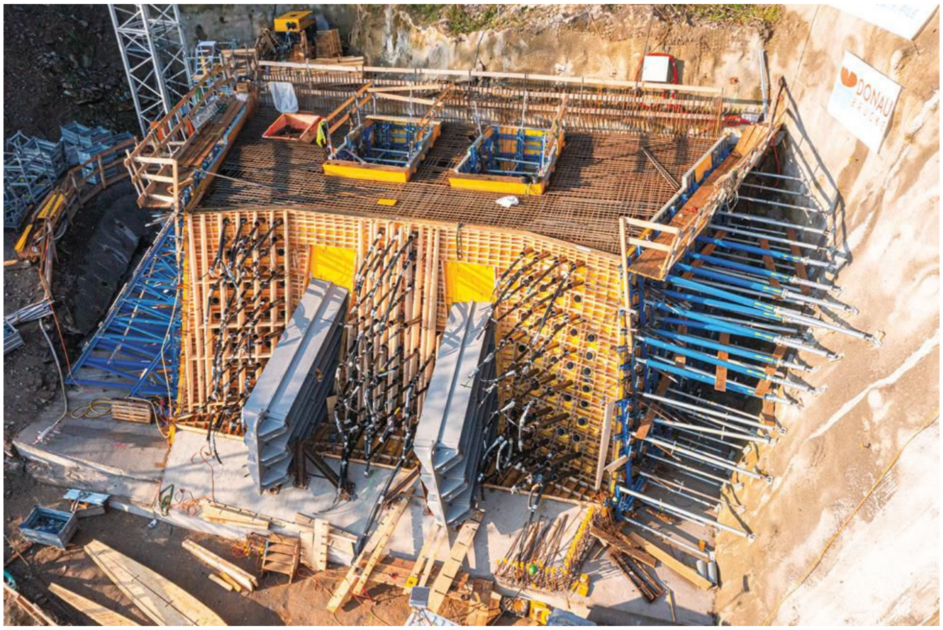
The project began in 2003 with a design competition that called for a pylon-free bridge to reach over this bend of the river. It connects two segments of the first completed phase of the A26 Linz motorway—they are tunneled through two mountainsides that are designated nature preserves—above existing highways and trunk lines flanking both riverbanks. The company led the winning bid alongside architecture firm Gerkan, Marg & Partners, based in Hamburg, and Innsbruck, Austria–based civil engineer Baumann + Obholzer Ingenieure. Rather than opting for a more traditional arched structure, the design team proposed a nearly 1,000-foot-long suspension bridge, fully anchored within the abutting rocky slopes, with a composite structure of prefabricated steel and concrete supporting it.

"The construction of a huge arch bridge would have been exceedingly difficult in this



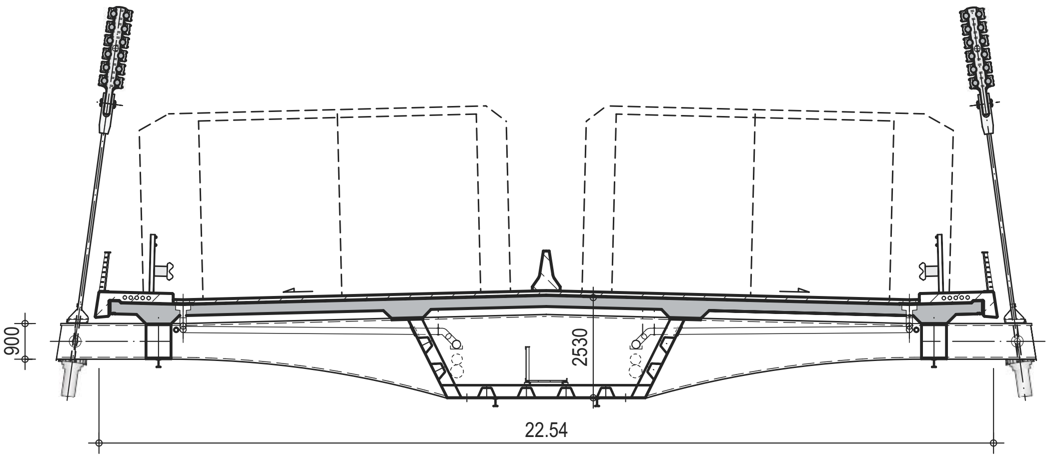
PHOTOGRAPHY: © CONNÉ VAN D'GRACHTEN (OPPOSITE); MATHIAS WIDMAYER (TOP); ASFINAG (BOTTOM)

THE BRIDGE spans the Danube (opposite). The concrete deck was poured atop prefabricated steel and concrete (above). The suspension cables are anchored at two points (right).



setting," notes SBP director Mathias Widmayer. "Our initial proposal consisted of two independent suspension bridges, for each direction of traffic, but we ultimately decided on using two anchorage points rather than four, and a single wide-deck bridge, as a more elegant solution that is also less disruptive to the context."

Work began in 2019 with the setting of anchor blocks on the north and south faces of the mountainsides. That process entailed the erection of temporary rockfall-protection walls, and the blasting and excavation of construction pits to make room for hundreds of grouted anchors, some over 200 feet in length, and their encasement within 785 cubic yards of reinforced concrete. The instal-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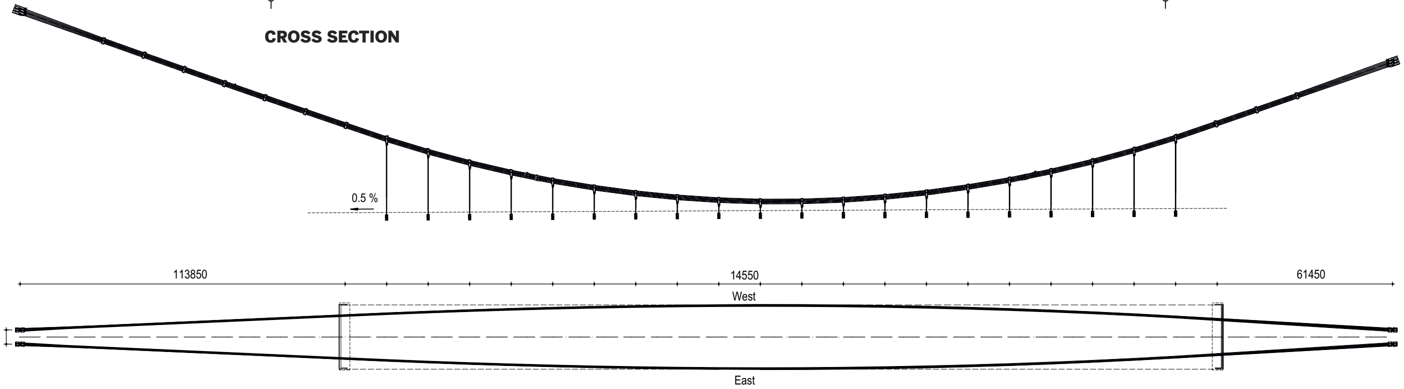
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CABLE SUPPORT STRUCTURE

PHOTOGRAPHY: © CONNÉ VAN D'GRACHTEN (BOTTOM); ASFINAG (OPPOSITE)

THE CABLE support system was designed to make the bridge column-free (opposite). The opening was celebrated in November (above).

lation of the main suspension-cable bundles began at the end of 2021; they comprise 12 parallel spiral cables, each nearly 6 inches in diameter and over 1,600 feet in length. Next came the hanger cables and clamps, spaced approximately 80 feet apart for the undergirding to come.

These prefabricated steel box and cross girders supporting the deck slab were produced in northern Italy by manufacturer and contractor Maeg Costruzioni and delivered 10 miles from the site as halved, road-transportation-size pieces, then reassembled to become nine segments. Each, at 80 feet wide, weighs up to 350 tons; they measure nearly 7 feet high under the bridge center but graduate in height to 3 feet at the bridge's ends. Each was designed with temporary connections, "which allowed us to perform a stress-free trial assembly off-site," adds Widmayer. "That process ensured a smooth installation of the prefabricated components and prevented a number of headaches down the line."

Two of the nine segments abutting the tunnels were set in place during the cable-installation process, with protective framework shielding the traffic flow below from any disruptions. The remaining seven segments, beginning in the middle, were transported by river on a stilt pontoon, that, once in place, could grasp the riverbed with its hydraulic legs to mitigate the Danube's high velocity as the pieces were craned into position, pinned to the cable structure, and bolted together. The segments, following review of their spacing and alignment, were then welded.

In fall 2022, work began on the placement of semi-finished, 3-inch-thick precast-concrete slabs, which were lifted and placed atop the steel girders and a light scaffolding system. Once the slabs were set, the team transitioned to pouring the concrete deck and applying mastic asphalt. The final leg of construction saw the bridge fitted with railings, road and architectural lighting, and drainage.

The Danube Valley Bridge and this phase of the A26 opened to the public in November 2024, offering an innovative and elegant structure without detracting from the region's greatest attraction, the river below. ■

SHIP TO STORE

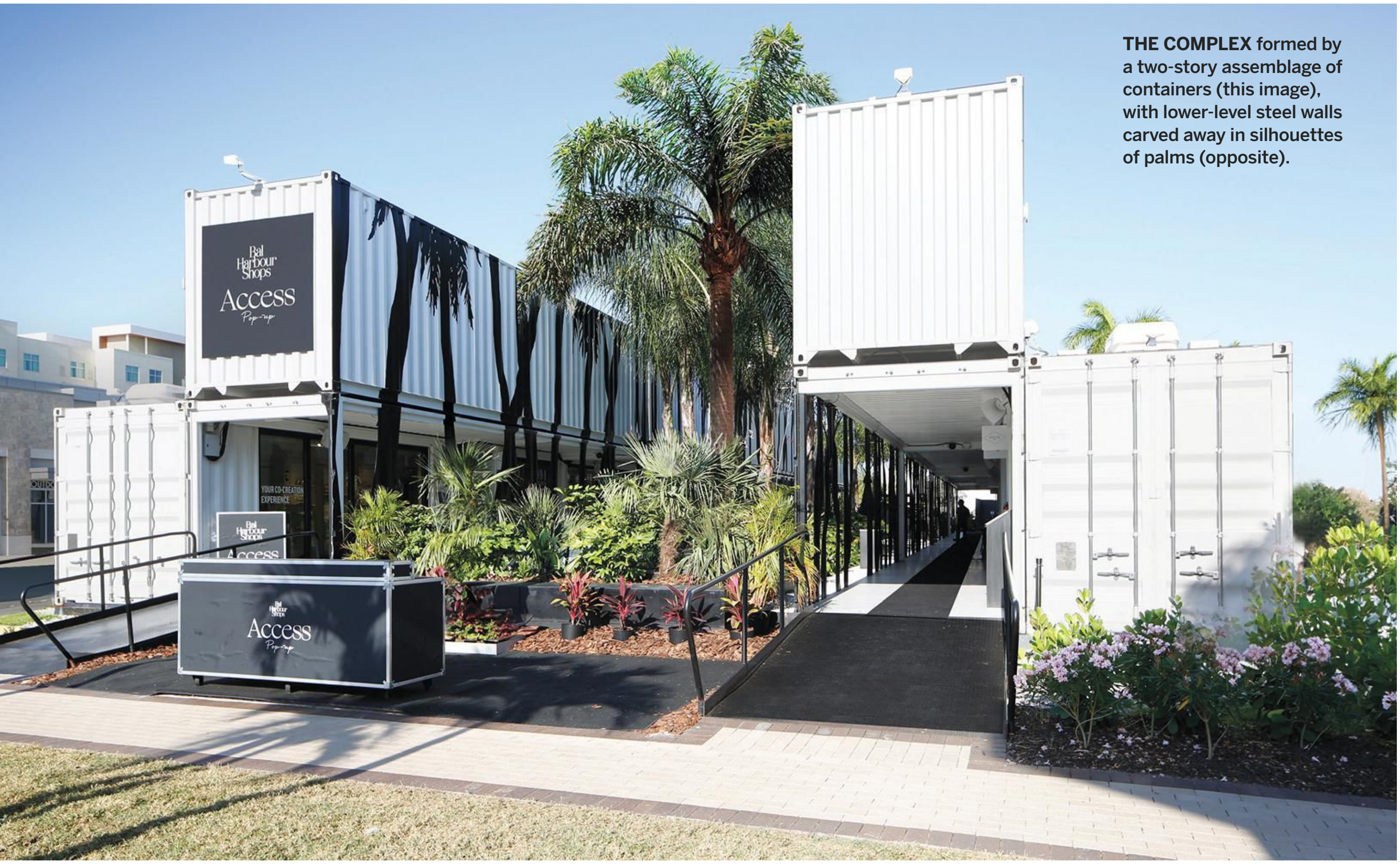
The Bal Harbour Shops Access Pop-Up transforms humble cargo containers into a retail oasis.

BY DAVID RIFKIND

PART OF THE PLEASURE of experiencing a LOT-EK building firsthand stems from the craft-like care with which the firm transforms ordinary objects of industrialized mass production into thought-provoking works of architecture. Since the early 2000s, partners Giuseppe Lignano and Ada Tolla have focused on one particular object in their practice—the ISO intermodal freight container—and their design for the Bal Harbour Shops Access Pop-Up in West Palm Beach, Florida, reflects more than two decades of research into the constructive potential of standardized cargo infrastructure.

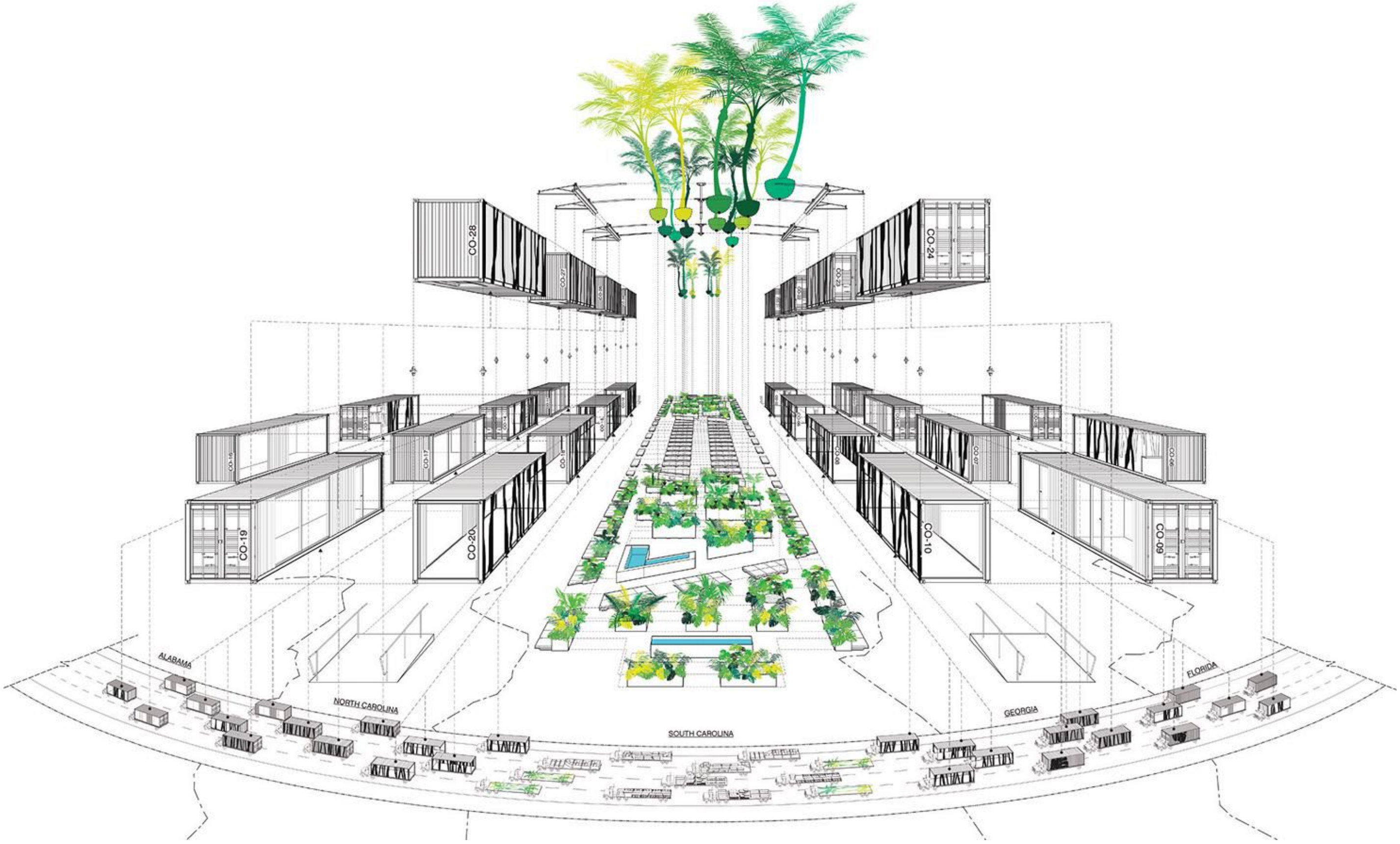
The temporary retail and dining facility hosts such luxury brands as Tiffany & Co., Balmain, and Dolce & Gabbana in an assemblage of 28 40-foot shipping containers designed to be easily relocated seasonally across the southeastern United States. The project was commissioned by Whitman Family Development, which opened its historic Bal Harbour Shops mall in Florida in 1965. The Bal Harbour Shops Access Pop-Up was launched in November 2023, in Raleigh, to expand the high-end shopping center's reach. It has been set up in four subsequent locations in the Carolinas and Florida, and is currently open in West Palm Beach through January 12. The client and design team sought to reproduce the experience of Bal Harbour in miniature, which meant replicating the open-air shopping mall's lushly planted courtyards and intimately scaled boutiques using components that could be easily shipped and reassembled.

LOT-EK was the ideal partner to lead the effort. The New York–based firm has designed a number of portable stores, including a 2008 pop-up pavilion for German sportswear brand Puma. That three-story building was assembled from 24 shipping containers and was erected in quayside locations in port cities like Boston, Stockholm, and Alicante, Spain. It also served as proof of concept that multicontainer projects using standard cargo infrastructure could be easily assembled, trans-



THE COMPLEX formed by a two-story assemblage of containers (this image), with lower-level steel walls carved away in silhouettes of palms (opposite).

PHOTOGRAPHY: © DANNY BRIGHT


CO-28
CO-24
CO-19
CO-20
CO-10
CO-09
ALABAMA
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
FLORIDA

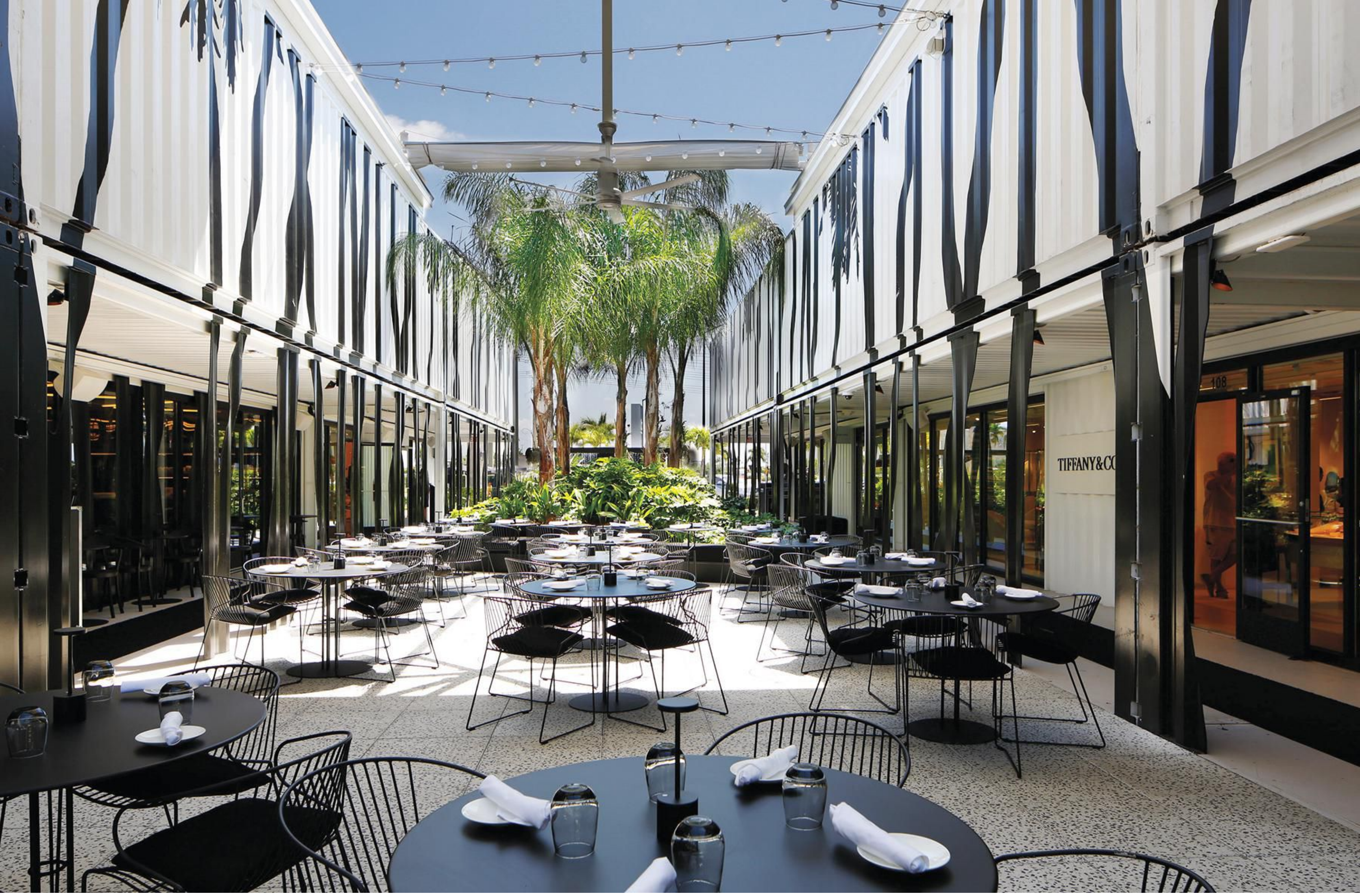
EXPLODED PERSPECTIVE VIEW

BALMAIN
PARIS

BOUTIQUES and a restaurant are at ground level (left and above), as is a spacious patio that anchors the courtyard (opposite).

ported, and reassembled. To achieve this efficiency, the architects embraced the use of conventional fittings and other hardware whenever possible.

For the Bal Harbour Access Pop-Up, LOT-EK adapted the modular language of the shipping container to embody the retail experience. The symmetrical complex is made up of a two-story assemblage of containers on either side of a courtyard. The lower-level units facing the courtyard have had their steel walls carved away in silhouettes of palms—one of the plants most associated with Bal Harbour Shops—that turn them into 160-foot-long porticoes granting access to the stores. While the boutiques and restaurant are all at ground level, the story above the colonnade contains gardens and patios, is lofty and full of light, and offers the tranquility of the original mall. For visitors accustomed to Bal Harbour, the Access Pop-Up is thus uncannily similar, despite the

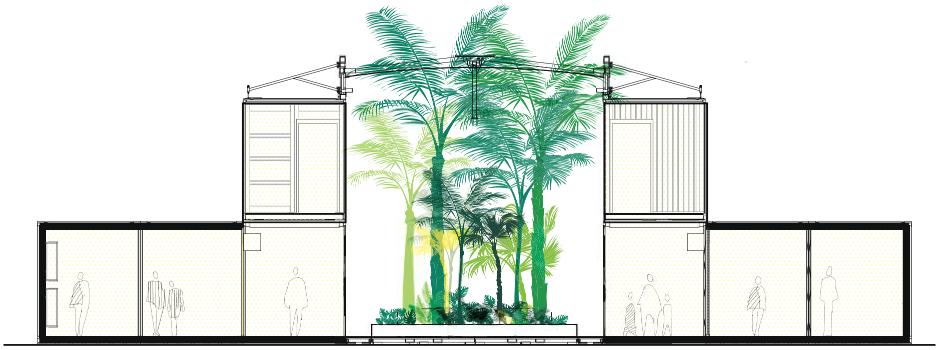


marked differences in material and scale.

Reinforcing that familiarity is the project's color palette, which matches the Bal Harbour Shops' distinctive white walls and black trim. The palm-silhouette cutouts that create a filigree peristyle around the courtyard are continued as painted organic forms on the second story. It's an inventive expansion of LOT-EK's long-standing practice of treating its containers' thin corrugated steel walls with either the application of bold supergraphics or the excision of geometric forms. In the Access Pop-Up courtyard, it combined the two brilliantly.

Studio Zewde—the New York–based practice of Landscape Architect Sara Zewde—was responsible for reinterpreting the Bal Harbour Shops courtyard in a smaller, portable form. Zewde created a variety of seating areas, ranging from a spacious patio serving the restaurant to more intimate spaces tucked between masses of thick tropical foliage; introduced koi ponds (another classic feature of Bal Harbour Shops), and added fountains at both end of the complex that establish aural thresholds to the pop-up mall from the outside world. The landscape is constructed of modular elements designed to be transported by truck. Smaller elements, like the pavers and any planters or water-feature segments under 7 feet tall, are packed into shipping containers for transport between installations. Larger components are carried on flatbed trailers.

Shipping containers have their limitations. The project requires a nearly flat site, for example. The lack of a sewer connection means that restrooms must be provided in separate trailers. And the interior dimensions of standardized freight containers can feel rather constrained. But the Bal Harbour Shops Access Pop-Up succeeds on its own terms. LOT-EK and Studio Zewde have embodied the experience of a historic South Florida shopping mall in an ephemeral yet elegant machine for shopping. ■



SECTION DRAWING SHOWING COURTYARD

David Rifkind is an architectural historian and a professor at the University of Florida School of Architecture.

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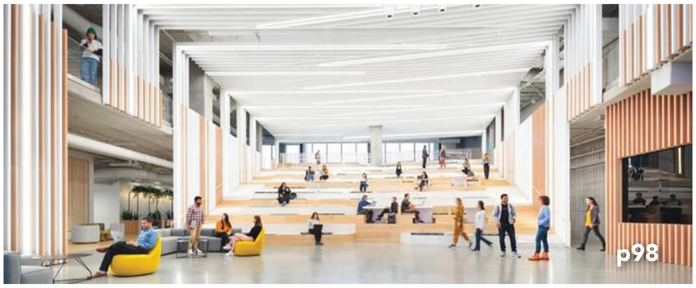
In this section, you will find five compelling courses highlighting creative solutions for tomorrow's buildings brought to you by industry leaders. Read a course, and then visit our online Continuing Education Center at ce.architecturalrecord.com to take the quiz free of charge to earn credits.

Photo courtesy of Armstrong World Industries



Beyond the Noise

Sponsored by Armstrong World Industries

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IN | AC | SU

Photo by Jeremy Bitterman /JBSA

Using Charred Wood for Exteriors and Interiors

Sponsored by Nakamoto Forestry North America

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BE | IN | PM

Photo courtesy of Propane Education & Research Council (PERC)

Propane and Building Design for Commercial Businesses

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PM | LS | SI

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Propane Gas Systems

Sponsored by The Propane Education & Research Council

CREDIT: 1 AIA LU/HSW; 0.1 ICC CEU; 1 IDCEC CEU/HSW; 1 GBCI CE HOUR; 1 IIBEC CEH

EM | RR | SU

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Focus on Facility Guidelines Institute Ceilings

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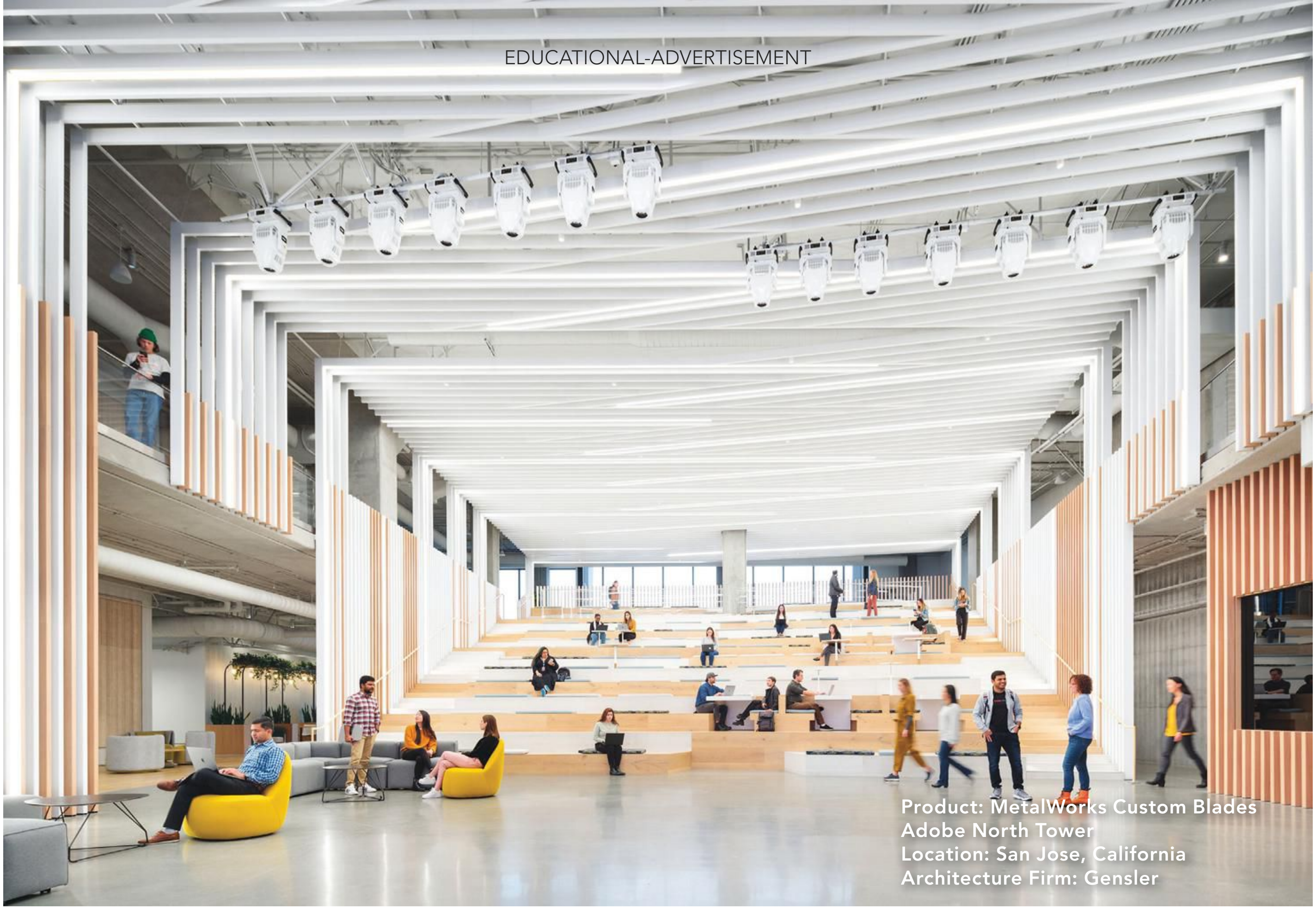
IN | PM | AC

CATEGORIES

AC	ACOUSTICS
BE	BUILDING ENVELOPE DESIGN
EM	ELECTRICAL AND MECHANICAL
IN	INTERIORS
LS	LIFE SAFETY AND CODES
PM	PRODUCTS AND MATERIALS
RR	RENOVATION AND RESTORATION
SI	SITE INFRASTRUCTURE DESIGN
SU	SUSTAINABILITY

Courses may qualify for learning hours through most Canadian provincial architectural associations.



Product: MetalWorks Custom Blades
Adobe North Tower
Location: San Jose, California
Architecture Firm: Gensler

Photo courtesy of Armstrong World Industries

Beyond the Noise

Elevating building design, performance, and experience with acoustics

Sponsored by Armstrong World Industries

This CEU will review the principles of acoustic design and how they affect indoor environmental quality, improving occupant comfort and well-being by using and understanding modern acoustical solutions and performance. We'll learn about incorporating acoustics into the design process from concept to completion to ensure function, aesthetics, and sustainability goals are being met and understand how acoustical standards, codes, and guidelines can influence design decisions.

Additionally, the course will highlight innovative approaches to integrating acoustics seamlessly into both new and existing building projects. By leveraging the latest advancements in acoustic technology, designers and architects can enhance spaces to better serve their occupants, creating environments that foster productivity, relaxation, and overall satisfaction.

▶ Continues at ce.architecturalrecord.com

CONTINUING EDUCATION

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IDCEC APPROVED 1 IDCEC CEU/HSW

ICC PREFERRED EDUCATION PROVIDER 0.1 ICC CEU

Learning Objectives

After completing this course, you should be able to:

1. Acknowledge the principles of acoustical design: Analyze and explore the fundamental principles related to interior acoustic design and their relationship to indoor environmental quality.
2. Identify the benefits of modern acoustical solutions: Explore how acoustical strategies improve occupant comfort, productivity, and well-being in various building types.
3. Evaluate acoustical materials and technologies: Gain insight into different materials, products, and design strategies that enhance acoustical performance without compromising aesthetic design goals.
4. Incorporate acoustics into the design process: Discover how to seamlessly integrate acoustical solutions from the conceptual phase through project completion, ensuring that spaces meet aesthetic, sustainability, and functional goals.
5. Meet industry acoustical codes and standards: Become familiar with key building codes, standards, and guidelines related to acoustics and how they influence design decisions.

To receive AIA credit, you are required to read the entire article and pass the quiz. Visit **ce.architecturalrecord.com** for the complete text and to take the quiz for free.

AIA COURSE #K2412U

Armstrong World Industries

Armstrong is committed to developing new and sustainable ceiling solutions, with design and performance possibilities that empower its customers to create beautiful, high-performance residential and commercial buildings.
armstrongceilings.com/commercial

Charred Japanese cedar wood known as yakisugi (or shou sugi ban outside of Japan) provides a variety of dramatic design and performance opportunities.

Photo by Jeremy Bitterman /JBSA

Using Charred Wood for Exteriors and Interiors

Yakisugi (shou sugi ban) is a material–not just a process or finish

Sponsored by: Nakamoto Forestry North America

Wood is a desirable building product for many reasons including aesthetic appeal, sustainability, and being economical. While many different approaches have been used to improve its durability and longevity, particularly in exterior applications, the Japanese process of charring the surface of the wood has gained popularity in the United States in recent years. Referred to as yakisugi in Japan and often as “shou sugi ban” in the West, the material is being specified and used in residential and commercial designs due to its enhanced durability and the aesthetic appeal of the charred wood. This course provides an in-depth exploration of authentic yakisugi/shou sugi ban and points out the differences with some similar treatment processes which can vary in their performance.

▶ Continues at ce.architecturalrecord.com

Peter J. Arsenault, *FAIA, NCARB, LEED AP is a nationally known architect who has authored nearly 300 continuing education courses focused on advancing building performance through better design. www.pjaarch.com www.linkedin.com/in/pjaarch*

CONTINUING EDUCATION

AIA Continuing Education Provider 1 AIA LU/HSW

0.1 ICC CEU

1 IDCEC CEU/HSW

GBCI 1 GBCI CE HOUR

Learning Objectives

After completing this course, you should be able to:

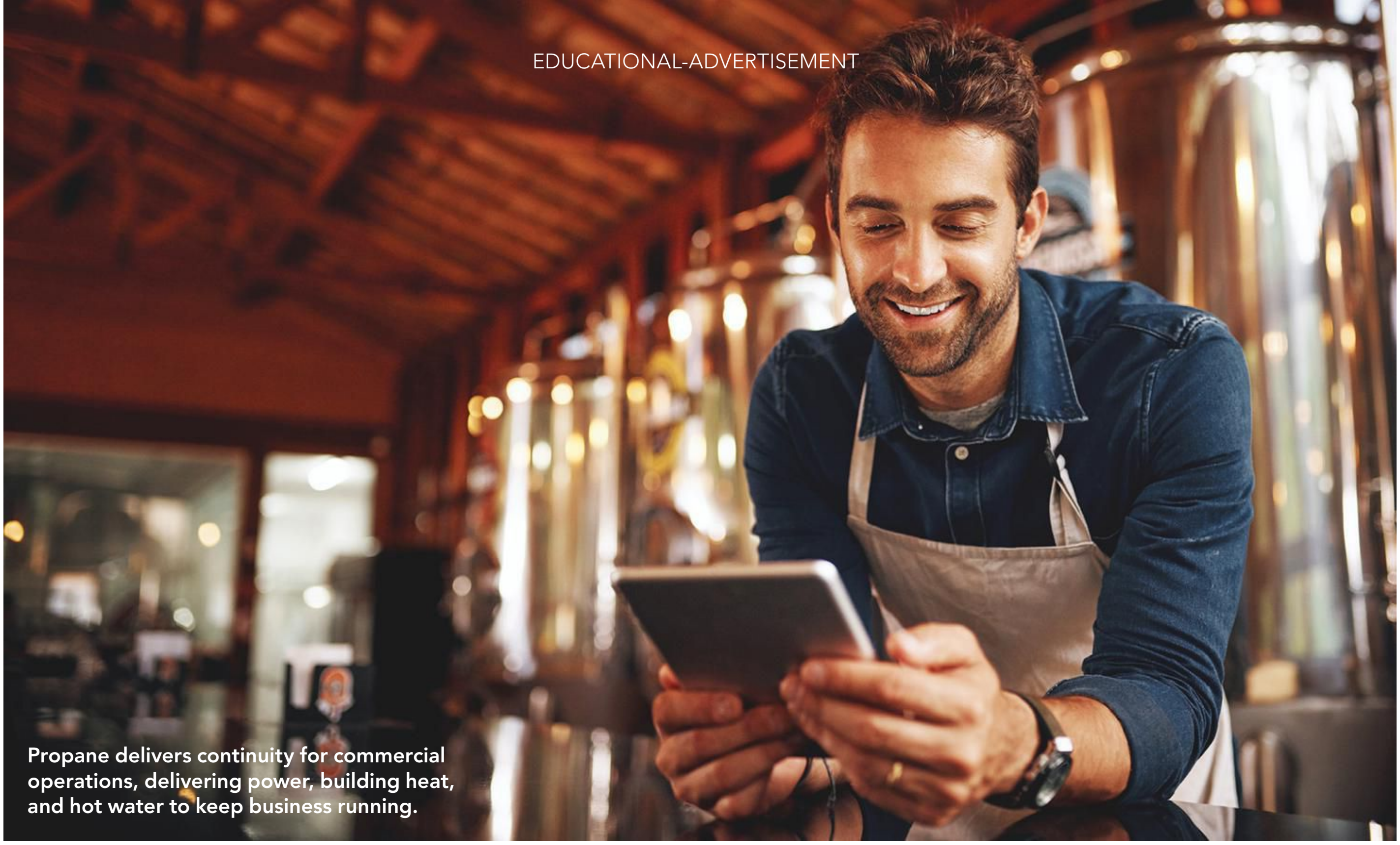
1. Recognize the true nature of authentic yakisugi wood products and how they can be part of an overall building design that is safe, durable, and sustainable.
2. Assess the safety performance aspects of exterior and interior yakisugi surfaces as they relate to durability and sustainability.
3. Explain the importance of proper selection of wood species, millwork, grading, and finishes to enhance aesthetics, dimensional stability, and durability.
4. Determine ways to incorporate the principles presented into buildings as shown in project examples.

To receive AIA credit, you are required to read the entire article and pass the quiz. Visit **ce.architecturalrecord.com** for the complete text and to take the quiz for free.

AIA COURSE #K2412V

NAKAMOTO FORESTRY

Founded in 1959, the **Nakamoto Zourin** group is the world’s largest manufacturer of authentic yakisugi “shou sugi ban” siding, which refers to intensely charred Japanese cedar. The Nakamoto family has managed sugi (Japanese cedar) and hinoki (Japanese cypress) forests in Hiroshima since the 1920s. As a pioneer in the industry, we make yakisugi according to Japanese tradition, while developing new technologies and products (such as innovative coatings) that enhance the durability and aesthetic beauty of our wood. Nakamoto Forestry is PEFC certified, a chain of custody sustainable forestry compliance standard. **Nakamoto Forestry North America** distributes throughout North America from a stocking warehouse and prefinish shop in Portland, Oregon. We have been recognized for a commitment to quality products, sustainable operations, and care for our local forests.



Propane delivers continuity for commercial operations, delivering power, building heat, and hot water to keep business running.

Photo courtesy of Propane Education & Research Council (PERC)

Propane and Building Design for Commercial Businesses

Efficient, sustainable solutions with propane in commercial building design

Sponsored by The Propane Education & Research Council

Architects, engineers, developers, and facilities managers have numerous choices when determining fuel sources for commercial buildings, whether those choices involve the practicalities of space and water heating, the aesthetics of fireplaces, fire pits, and outdoor lighting, or the functionalities of building site energy needs. Combined with these choices is the ever-increasing need to build and plan not only cost-effectively, but with sustainability in mind.

This course will help specifiers compare the advantages and disadvantages of a variety of fuel sources and storage options, as well as examine the flexibility and reliability of propane so that they can more readily determine which fuel source best meets the needs of individual commercial projects.

In addition, the course offers insight into how fuel source decisions can directly impact the comfort, aesthetics, and usability of a space, helping stakeholders balance practicality with design vision. With this knowledge, participants will be equipped to make more informed decisions that align with the unique demands of their projects.

▶ Continues at ce.architecturalrecord.com

CONTINUING EDUCATION

1 AIA LU/HSW
1 GBCI CE HOUR
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0.1 ICC CEU

Learning Objectives

After completing this course, you should be able to:

1. Assess different fuel sources as well as their advantages and disadvantages.
2. Review the basic principles of propane as a building fuel source.
3. Evaluate the power demands of a commercial building and the most efficient and sustainable options for meeting those demands.
4. Analyze ways in which propane can solve commercial building challenges and enhance design.

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AIA COURSE #K2410Z

ENERGY FOR EVERYONE propane

The Propane Education & Research Council is a nonprofit that provides leading propane safety and training programs and invests in research and development of new propane-powered technologies. PERC programs benefit a variety of markets including residential and commercial building.

Propane cooking equipment delivers performance, decreases fuel consumption, and provides convenience and functionality in any kitchen.

Photo courtesy of Propane Education & Research Council (PERC)

Propane Gas Systems

Considerations for Residential Construction

Sponsored by The Propane Education & Research Council

When planning and designing homes, architects should know that more than 12.6 million U.S. households rely on propane for their primary energy needs. Propane has many advantages such as offering heat for water, outdoor spaces, and inside the home. In addition, propane provides clean fuel for comforting fireplaces, cooking food, and drying clothing. Propane can be stored above ground or in underground propane tanks, an option many builders are choosing in order to fuel homes off the natural gas mains. This course will cover important considerations when planning for propane use in residential construction.

Propane is one of the many by-products of oil refining and natural gas processing, and with the largest storage capacity in the world, the United States propane supply is abundant. Pipelines, processing facilities, refueling stations, distribution centers, and storage facilities already exist across the country, making large capital investments in infrastructure unnecessary. Over 99% of the propane used in the U.S. is produced in North America.

Continues at ce.architecturalrecord.com

CONTINUING EDUCATION

1 AIA LU/HSW
0.1 ICC CEU
1 IDCEC CEU/HSW
1 GBCI CE HOUR
1 IIBEC CEH

Learning Objectives

After completing this course, you should be able to:

1. Explore the role of propane as an energy choice, as well as electricity, gas, heating oil, and solar energy.
2. Examine how propane benefits the environment and well-being of occupants within residential spaces.
3. Analyze how propane can benefit occupants in various residential applications, specifically propane use inside the home, outside the home, and temporary heating during construction.
4. Identify aspects of propane specification such as propane services, tank size considerations, and tank options.
5. Comprehend the opportunity for Zero Net Energy homes and how "zero" may be defined.

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AIA COURSE #K2410Y

ENERGY FOR EVERYONE
propane

The Propane Education & Research Council is a nonprofit that provides leading propane safety and training programs and invests in research and development of new propane-powered technologies. PERC programs benefit a variety of markets including residential and commercial building.

The Facility Guidelines Institute (FGI) Guidelines provide much-needed standards for the design of healthcare facilities and are an important tool for architects.

Photo courtesy of Rockfon

Focus on Facility Guidelines Institute Ceilings

Navigating the FGI ceiling requirements in healthcare facilities to ensure compliance and acoustic comfort

Sponsored by Rockfon | *By Andrew A. Hunt*

The Facility Guidelines Institute (FGI) is a non-profit organization that creates comprehensive guidelines and best practices for the design and construction of healthcare facilities. Its Guidelines ensure that healthcare environments, including hospitals, clinics, and specialized medical centers, are safe, and effective, and promote the well-being of patients and staff. Adherence to FGI Guidelines is critical in healthcare facility design, as they address a wide array of considerations, including environmental health, safety, acoustics, and infection control.

A key component in creating a healthy, safe, aesthetically pleasing, and sustainable healthcare facility is the design and specification of ceilings. FGI mandates ceilings in all spaces, except mechanical rooms, to ensure the physical environment supports the operations and cleanliness needed in healthcare settings. The type and style of ceiling specified by architects can contribute in many ways to improving the patient experience, as well as impact the outcome of medical procedures, recovery, and duration of care. A significant element that impacts both patients and staff in healthcare settings is acoustic design. Everything from privacy to rest and recovery can be impacted by the amount of noise in the space. Because privacy, rest, and recovery are integral in healthcare treatment, it is important to create designs for healthcare settings that comply with FGI standards including acoustic needs, all of which can be challenging and critical for the architect. Specifically, acoustical ceiling systems can promote noise abatement and provide privacy, both important attributes

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Learning Objectives

After completing this course, you should be able to:

1. Define what the Facility Guidelines Institute (FGI) is and the role its Guidelines play in specifying systems and materials for healthcare facilities.
2. Identify the FGI requirements for ceilings in all spaces, except mechanical rooms, and explain their significance in healthcare environments.
3. Explain the three definitions of unrestricted, semi-restricted, and restricted areas as defined by FGI for healthcare facilities.
4. Describe how the appropriate and thoughtful selection of ceiling systems and materials can contribute to acoustic comfort and promote a healthy and safe environment for patients, staff, and visitors.

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to enable the healing of patients and the well-being of staff and visitors.

This article will provide guidance and suggestions for both the architect and designer to help navigate the FGI ceiling requirements while also promoting best practices to enhance and ensure a positive and productive healthcare environment through acoustical ceiling design.

OVERVIEW OF THE FACILITY GUIDELINES INSTITUTE (FGI)

FGI is a nonprofit organization dedicated to promoting safety and quality in healthcare facility design. FGI publishes Guidelines that are widely recognized as the gold standard for the planning, construction, and design of hospitals, outpatient facilities, and other healthcare environments. These Guidelines are regularly updated to reflect new findings in healthcare delivery, patient safety, and building performance. The process required by the FGI helps establish that facilities are equipped to safeguard the best possible outcomes for patients and staff alike.

As the healthcare industry continues to evolve, with advances in medical technologies and a heightened emphasis on patient-centered care, these Guidelines have become increasingly vital. They provide a structured framework that informs the design, construction, and renovation of healthcare facilities, ensuring that buildings meet the industry-acceptable standards of safety, efficiency, and quality. For architects who design healthcare spaces, understanding and adhering to the FGI Guidelines is not just beneficial; it's essential to doing good work.

History of the FGI

The origins of the Facility Guidelines Institute can be traced back to the early 20th century, as healthcare facility design became increasingly specialized. The original Guidelines for healthcare facility construction were created in 1947 by the U.S. Public Health Service as General Standards and appeared in the Federal Register in 1947. Over the decades since then, these Guidelines evolved in response to advancements in medicine and technology, as well as shifts in healthcare delivery models.

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Today, the FGI Guidelines are recognized as the authoritative resource for healthcare construction and are referenced by regulatory agencies, accrediting bodies, and healthcare organizations across the United States. In many cases, these Guidelines are incorporated into state and local building codes, making adherence to them a legal requirement for healthcare facility projects.

The documents produced by FGI are updated and revised every four years by a dedicated group of healthcare experts serving on the Health Guidelines Revision Committee (HGRC). The process is a consensus-based approach during which a wide range of members of the healthcare community are encouraged to provide suggestions, comments, and feedback to help update and improve the Guidelines. Over the years, FGI has partnered with other industry organizations to ensure the content is complete, accurate, and relevant to modern building codes, standards, and expectations. For instance, in the 2010 update of the Guidelines, the HGRC voted to abandon previous Guidelines ventilation tables and data and instead partner with the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) by adopting ASHRAE 170 in its entirety.

A significant update to the 2018 edition included more information and a reference table to help designers and owners quickly determine which procedure should be performed in each room type; updated clearances required for operating rooms; requirements addressing sustainable design; and accommodations for telemedicine services. In addition, the existing acoustic criteria in the Guidelines were reviewed by the Acoustics Proposal Review Committee, leading to an update to acoustic requirements.

▶ Continues at ce.architecturalrecord.com

***Andrew A. Hunt** is Vice President of Confluence Communications and specializes in writing, design, and production of articles and presentations related to sustainable design in the built environment. In addition to instructional design, writing, and project management, Andrew is an accomplished musician and voice-over actor, providing score and narration for both the entertainment and education arena. www.confluencec.com www.linkedin.com/in/andrew-a-hunt-91b747*

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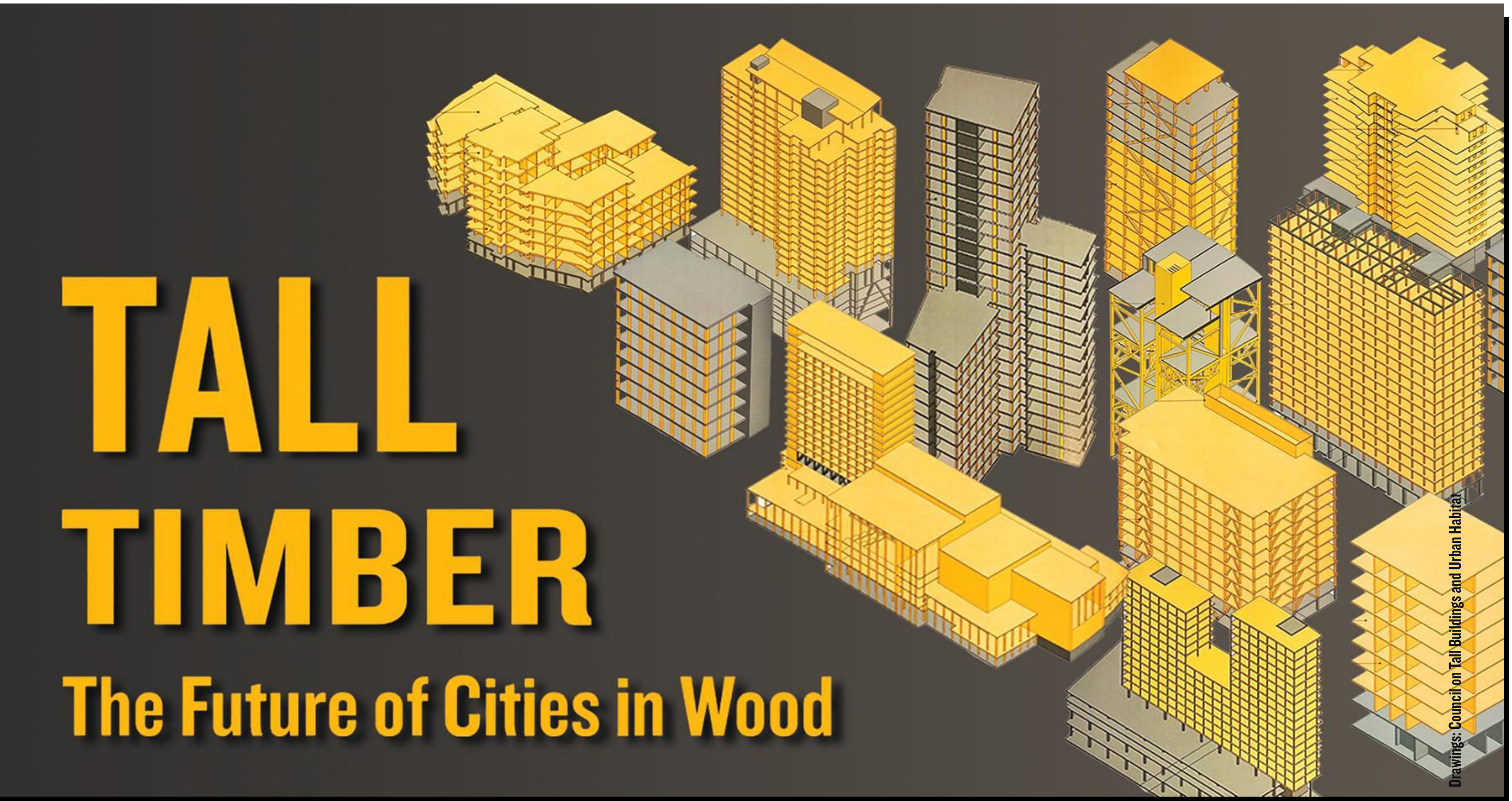
DATES & Events

Ongoing Exhibitions

Visible Vault: Open Collections Storage
Washington, D.C.
To be permanent
The National Building Museum unveils a landmark permanent exhibition providing unprecedented access to over 2,500 artifacts from its collection of 500,000 objects. The exhibition transforms previously inaccessible storage spaces into public galleries, featuring architectural models by I.M. Pei and Frank Gehry, historic building fragments and construction tools, and America's largest collection of architectural toys. Interactive display cases invite visitors to discover light-sensitive materials and small objects, while an integrated digital platform provides deeper context for the artifacts. See nbm.org.

Rural Rebellion
Berlin
Through January 24, 2025
The Aedes Architecture Forum presents its second monographic exhibition of Berlin-based Christoph Hesse Architects, exploring the practice's innovative approach to rural development and sustainable community building. Drawing from Hesse's agricultural background, the exhibition showcases projects across five thematic areas through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models, panoramic drawings, and films. Interventions on view demonstrate how architectural practice can foster social cohesion and ecological responsibility while redefining rural areas as centers of innovation. Featured works include the Open Mind Places installations in Sauerland, the House of Knowledge in Xinyang, and collaborations spanning countries from Saudi Arabia to Egypt. See aedes-arc.de.

Dogma: Urban Villa
Antwerp, Belgium
Through February 9, 2025
Organized by Brussels-based architectural firm Dogma, an exhibition on view at the Flanders Architecture Institute examines the “urban villa” typology, tracing the evolution of these compact multi-unit dwellings from their 19th-century origins as speculative developments to their potential as cooperative living spaces. Through historical analysis that spans the cities of Lausanne, Berlin, and Rome, paired with five new design proposals, Dogma challenges the typology’s market-driven roots and envisions its transformation into a model for affordable communal housing. See vai.be.

Architecture for Dogs
Milan
Through February 16, 2025
The ADI Design Museum hosts an exhibition reimagining the relationship between canines and the built environment. Making its Italian debut, the show features architectural installations from practitioners including Kazuyo Sejima, Kengo Kuma, and Toyo Ito, alongside new contributions from Italian designers Giulio Iacchetti and Piero Lissoni. The works—ranging from vertical doghouses to interactive ramps and benches—explore design as a cross-species language, moving beyond traditional pet architecture to examine the aesthetic and emotional dimensions of shared spaces. The exhibition’s participatory approach extends virtually through freely downloadable blueprints. For more information, see adidesignmuseum.org.

Frederick Kiesler: Vision Machines
Chicago
Through March 15, 2025
The Graham Foundation revisits the experimental practice of Frederick Kiesler through his groundbreaking work at Columbia University’s Laboratory for Design Correlation in the late 1930s and early 1940s. Organized by New York’s Jewish Museum in cooperation with the Austrian Frederick and Lillian Kiesler Private Foundation, the exhibition centers on two pivotal projects: the Mobile Home Library—presented here in its first complete fabrication—and the Vision Machine. The former appears as a circular array of rotating bookshelves that reimagines domestic space, while the latter shows Kiesler’s ambitious attempt to represent human sight and dream content. The show marks a homecoming for Kiesler, who received one of the Foundation’s inaugural fellowships in 1957. For more information, see grahamfoundation.org.

People Look Up at Good Architecture
New Haven, Connecticut
Through May 11, 2025
Yale University’s Robert B. Haas Family Arts Library marks the spring reopening of the Yale Center for British Art with an archival exhibition exploring the history and architectural significance of the building, which was Louis Kahn’s final architectural commission. Through photographs, letters, sketches, and other archival materials from the university’s collection, the exhibition illuminates the Center’s pivotal role in American museum architecture and its significance as the culmination of Kahn’s architectural vision. For more, see guides.library.yale.edu.

Events

New York Build Expo 2025
New York
March 12–13, 2025
The design- and construction-focused trade show will be returning to the Javits Center for its ninth edition. The two-day event showcases products and technology from over 500 brands and a roster of over 500 speakers. For more, see newyorkbuildexpo.com.

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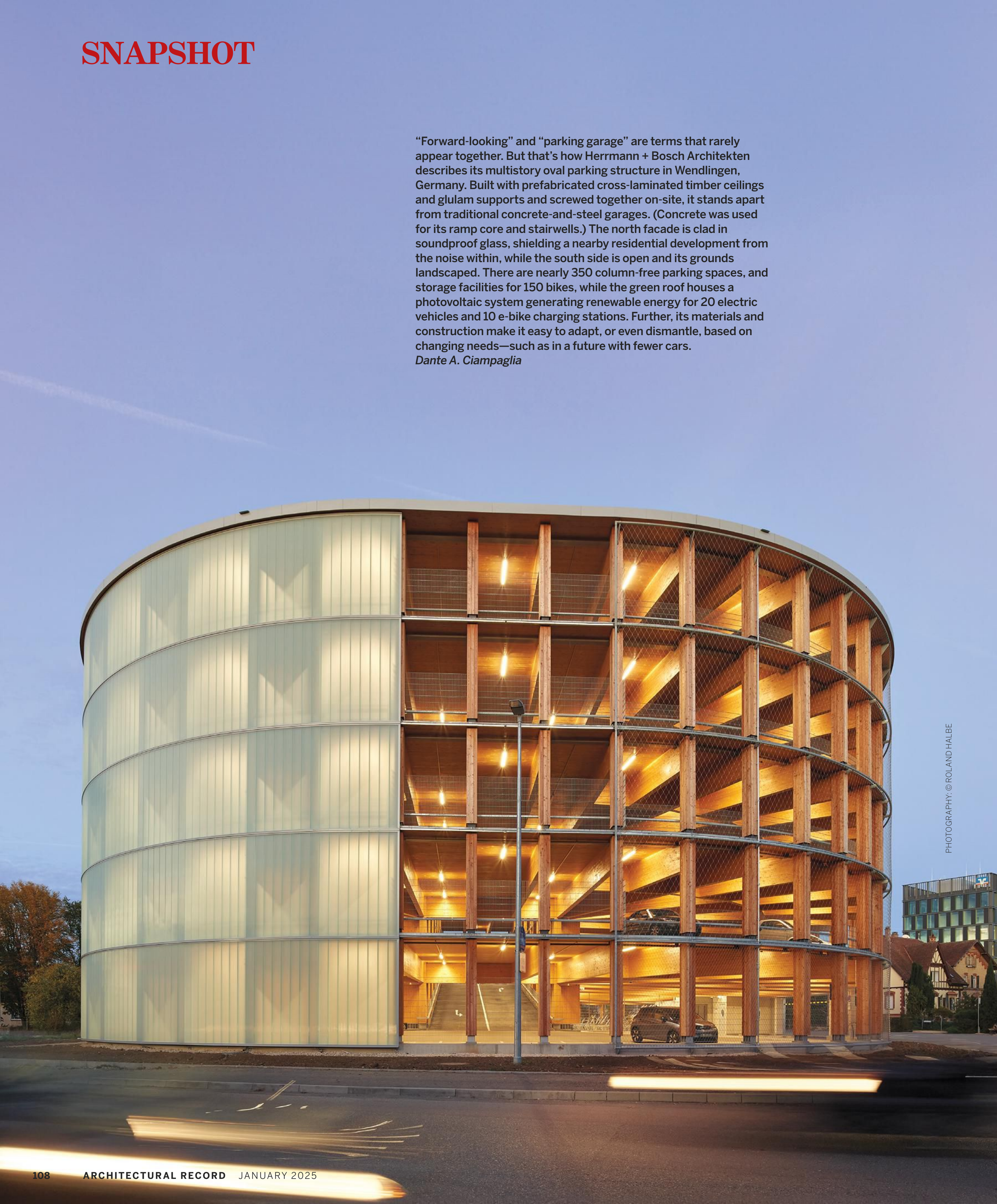
Ⓡ Regional Insert

SNAPSHOT

“Forward-looking” and “parking garage” are terms that rarely appear together. But that’s how Herrmann + Bosch Architekten describes its multistory oval parking structure in Wendlingen, Germany. Built with prefabricated cross-laminated timber ceilings and glulam supports and screwed together on-site, it stands apart from traditional concrete-and-steel garages. (Concrete was used for its ramp core and stairwells.) The north facade is clad in soundproof glass, shielding a nearby residential development from the noise within, while the south side is open and its grounds landscaped. There are nearly 350 column-free parking spaces, and storage facilities for 150 bikes, while the green roof houses a photovoltaic system generating renewable energy for 20 electric vehicles and 10 e-bike charging stations. Further, its materials and construction make it easy to adapt, or even dismantle, based on changing needs—such as in a future with fewer cars.
Dante A. Ciampaglia



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